



WELL INFORMATION					
MWD Run Number	100	200			
Date run completed	03-Jan-15	01-Feb-15			
Rig Bit Number	0100	0200			
Bit Size (in)	8.750	6.125			
Tool Nominal OD (in)	6.750	4.750			
Log Start Depth (MD, ft)	1,369.00	7,812.00			
Log End Depth (MD, ft)	7,812.00	17,574.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	01-Jan-15 16:00	29-Jan-15 07:00			
Drill/Wipe End Date and Time	03-Jan-15 06:30	01-Feb-15 07:30			
Min Inc (deg) @ Depth (MD, ft)	0.26 @ 6,822.00	88.34 @ 14,658.00			
Max Inc (deg) @ Depth (MD, ft)	86.02 @ 7,765.00	91.76 @ 16,360.00			
Bit TFA(in2) / Bit Type	1.11 / PDC	1.73 / PDC			
Flow Rate (gpm)	600.00	293.87			
Max AV (fpm) / CV (fpm) @ MWD	350.0 / 450.0	472.0 / 472.0			
Fluid Type	Polymer	Diesel Mud Base			
Density (ppg) / Viscosity (spqt)	9.50 / 31.00	9.20 / 60.00			
Filtrate CL (ppm)	400.00	100.00			
pH / Fluid Loss (mptm)	9.70 / 0	N/A / N/A			
PV (cP) / YP (lbf2)	4 / 4.00	23 / 11.00			
% Solids / % Sand	1.8 / 0.1	2.8 / 0.1			
% Oil / Oil:Water Ratio	N/A / N/A	10 / 95:5			
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Max Tool Temp (in F) @ S	175.04 / PDM	222.0 / PDM			

Max Tool Temp (degF) / Source	175.21 / PCM	260.0 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	adam sampson	adam sampson			
Customer Representative	dave wells	dave wells			

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.93	5.93			
Sub Serial Number	11341335	12365894			
Insert Serial Number	12001066	11620312			
Date and Time Initialized	03-Jan-15 09:00	28-Jan-15 12:37			
Date and Time Read	05-Jan-15 15:00	01-Feb-15 22:00			
ECMB SW Version	N/A	N/A			

### Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	47.00	48.00			
Software Version	6.21	6.33			
Sub Serial Number	11341335	12365894			
Sonde Serial Number	11478094	11062120			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	152.68	308.20			

### Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	50.00	50.90			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11341335	12365894			
Insert/Sonde Serial Number	11579842	11293347			

## REMARKS

1. All depths are measured depths referenced to the Driller's pipe tally and are measured from the Drill Floor, unless otherwise specified.

2. No depth corrections have been made for pipe stretch or compression.

3. All data presented is recorded data unless otherwise specified

4. The following smoothing parameters have been applied to the data:

PGRC (Corrected Gamma Ray):  
Interval Resolution: 0.5 ft  
Interval Distance: 0.6 ft  
Gap Fill: 3.0 ft

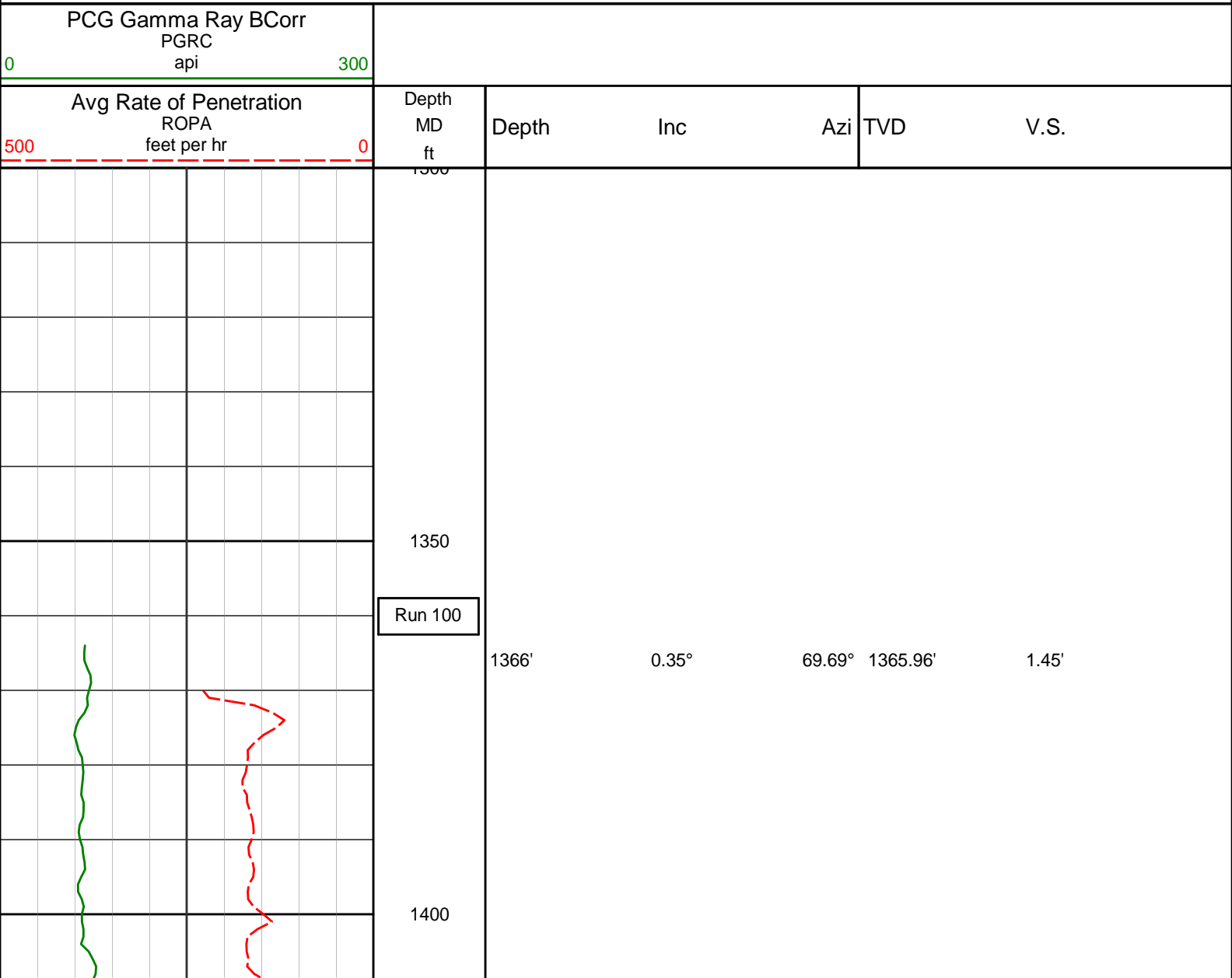
ROPA (Average Rate of Penetration):  
Interval Resolution: 0.5 ft  
Interval Distance: 1.2 ft  
Gap Fill : 3.0 ft

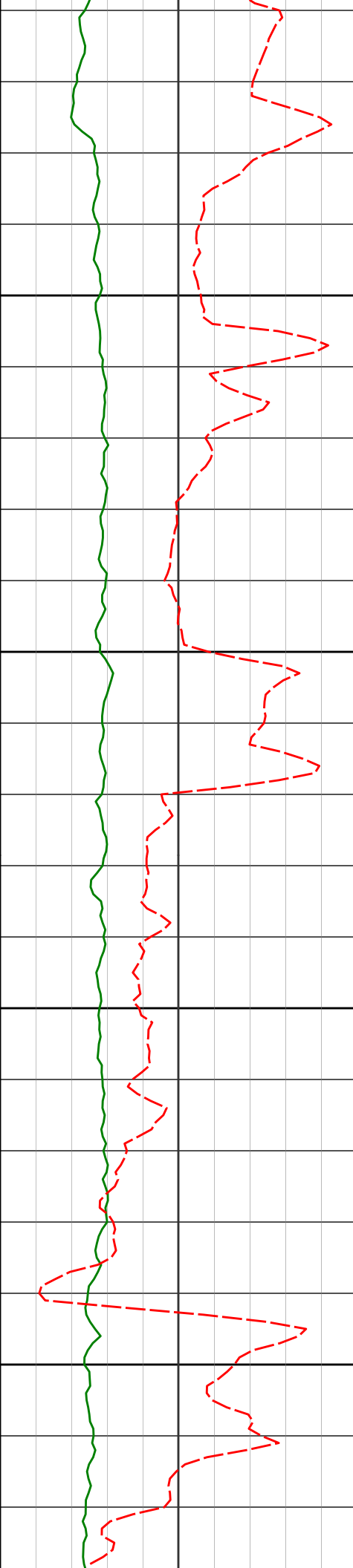
5. INSITE version 8.1.1

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MD Detail 1:240 Scale





1450

1500

1550

1600

1458'

1.65°

192.60° 1457.95'

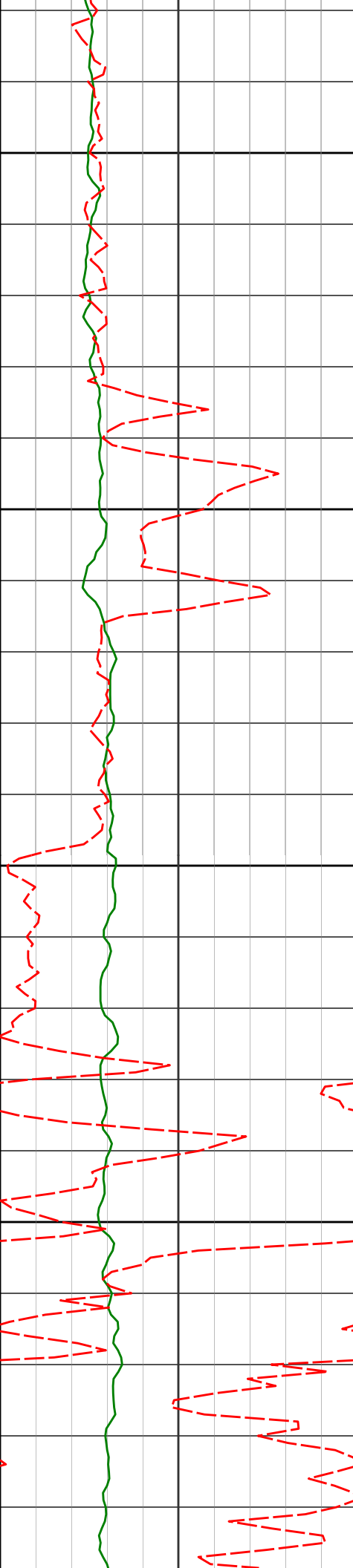
0.25'

1550'

3.37°

193.02° 1549.86'

-3.70'



1650

1700

1750

1800

1643'

4.90°

193.91° 1642.61'

-10.25'

1734'

7.33°

196.85° 1733.09'

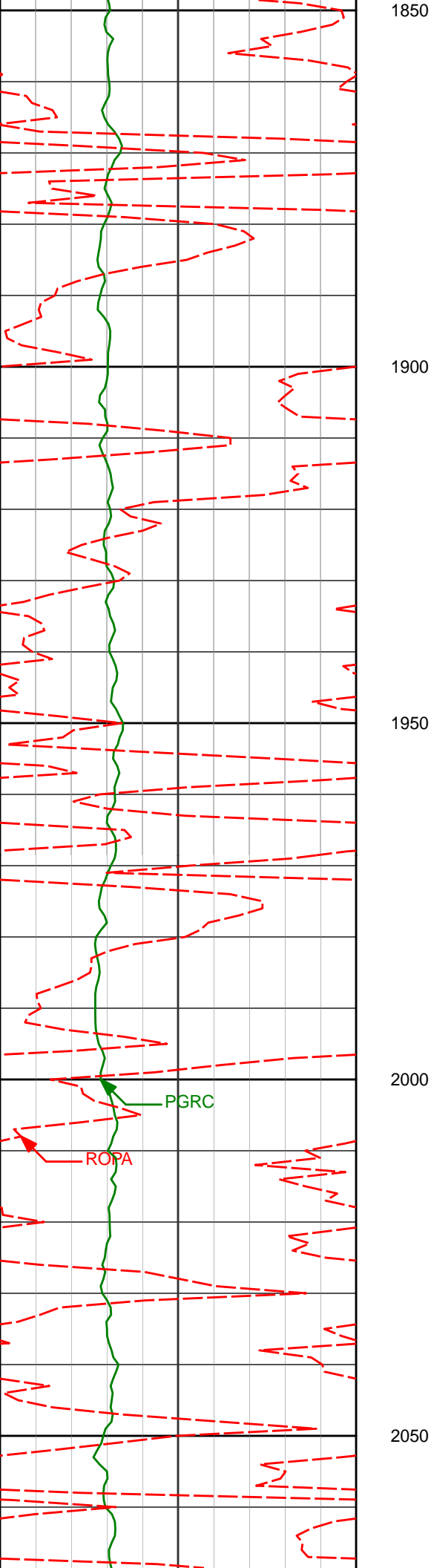
-19.65'

1826'

8.44°

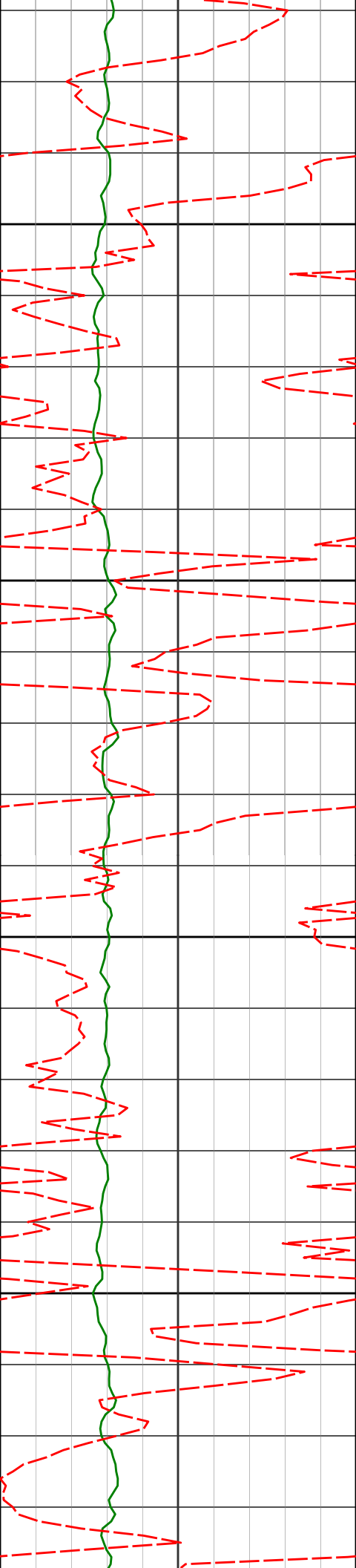
202.25° 1824.22'

-31.61'



1917'      10.10°      193.01°    1914.03'      -45.67'

2011'      12.88°      184.14°    2006.15'      -64.22'



2100

2150

2200

2250

2105'

14.63°

180.66° 2097.45'

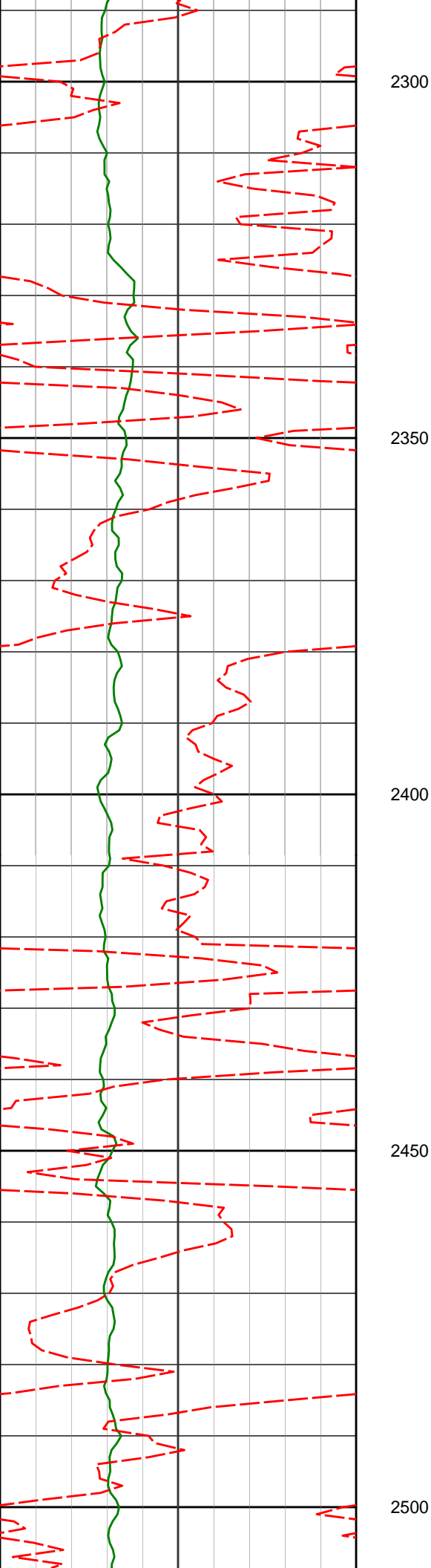
-86.56'

2200'

14.02°

174.67° 2189.50'

-109.98'



2294'

15.58°

179.52° 2280.38'

-133.91'

2300

2350

2388'

16.34°

184.79° 2370.76'

-159.73'

2400

2450

2483'

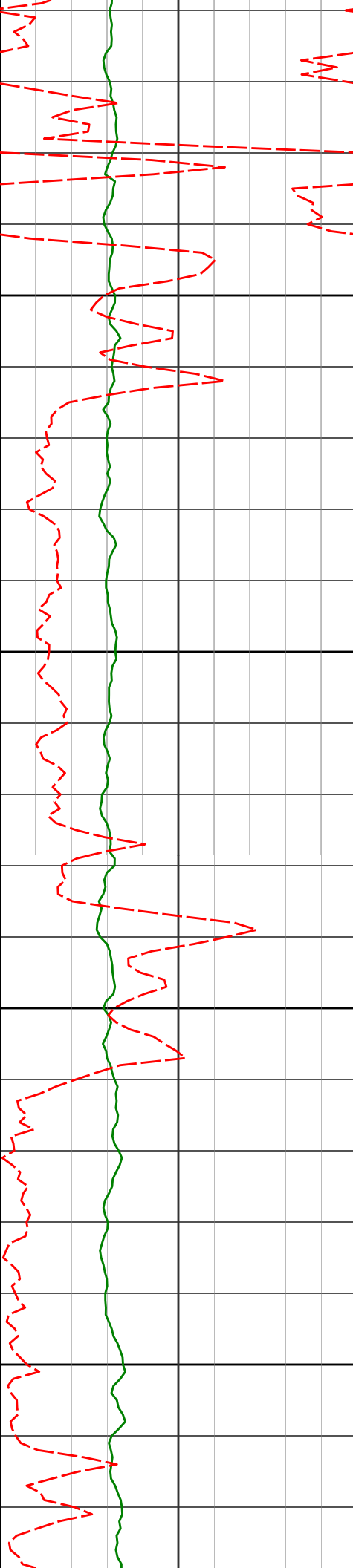
16.80°

183.80° 2461.82'

-186.78'

2500





2550

2600

2650

2700

2577'

16.21°

176.36° 2551.96'

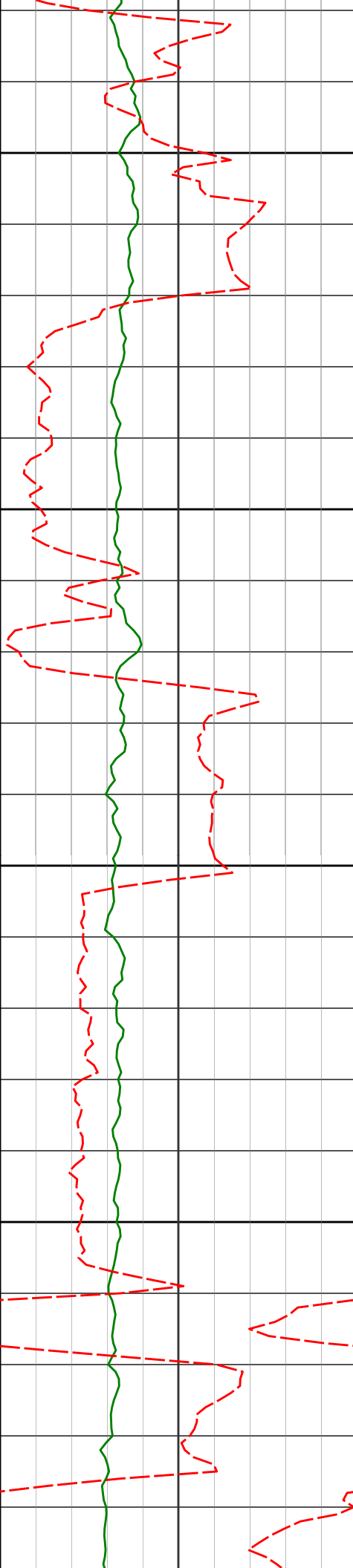
-213.43'

2671'

15.79°

170.60° 2642.32'

-239.06'



2750

2765'

14.18°

164.39°

2733.13'

-262.64'

2800

2850

2860'

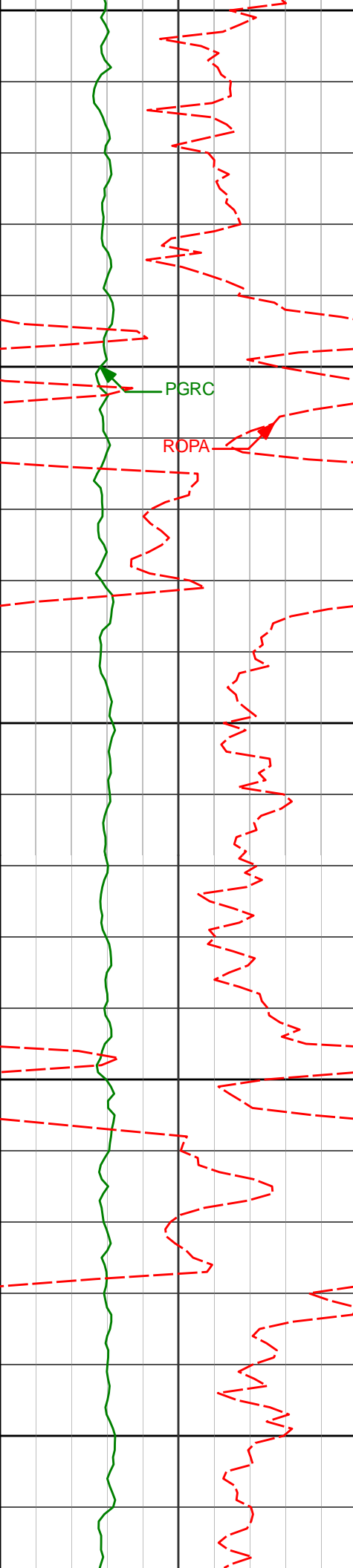
17.07°

177.36°

2824.63'

-287.68'

2900



2950

2954'

18.32°

182.69°

2914.19'

-316.22'

3000

PGRC

ROPA

3050

3048'

19.63°

188.33°

3003.09'

-346.66'

3100

3150

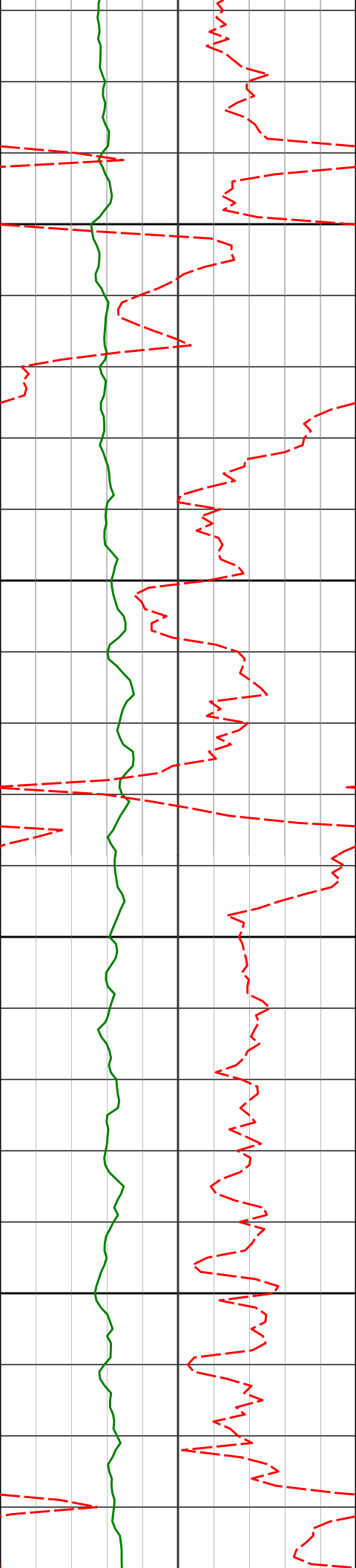
3142'

20.50°

185.90°

3091.38'

-378.75'



3200

3250

3300

3350

3237'

21.58°

184.86° 3180.05'

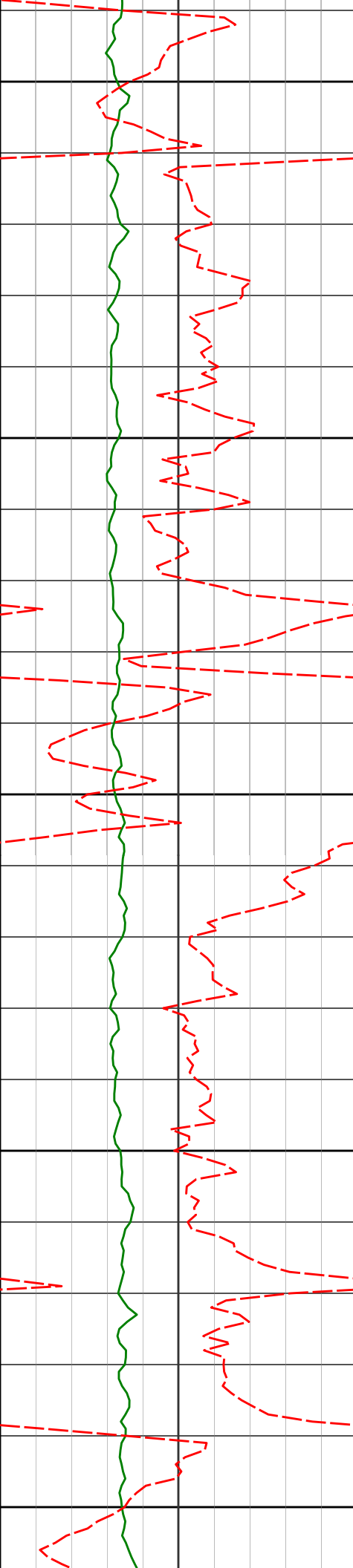
-412.77'

3331'

19.23°

185.08° 3268.14'

-445.48'



3400

3426'

20.05°

180.39° 3357.62'

-477.38'

3450

3500

3520'

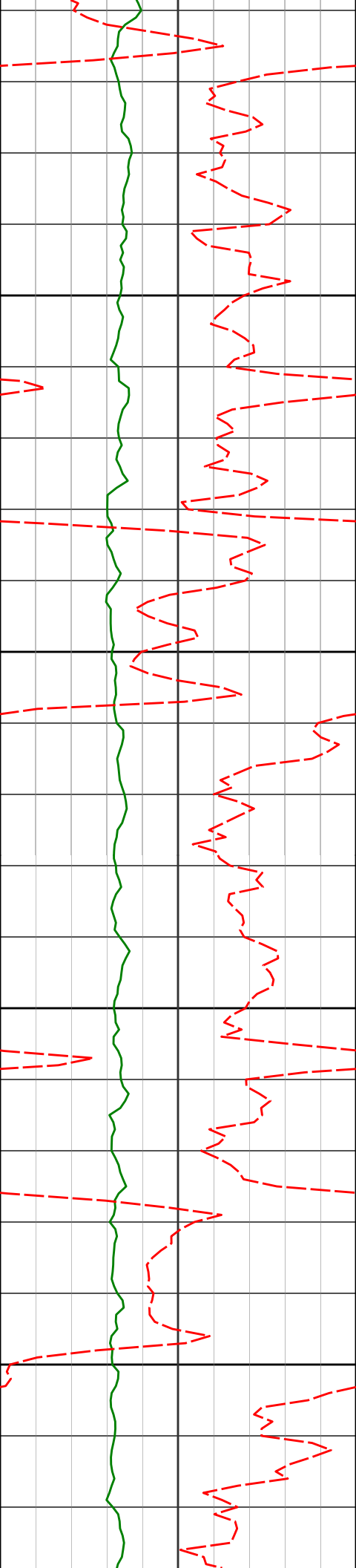
18.43°

181.31° 3446.37'

-508.35'

3550

3600



3614'

19.67°

178.66° 3535.22'

-539.01'

3650

3700

3709'

20.52°

178.23° 3624.44'

-571.61'

3750

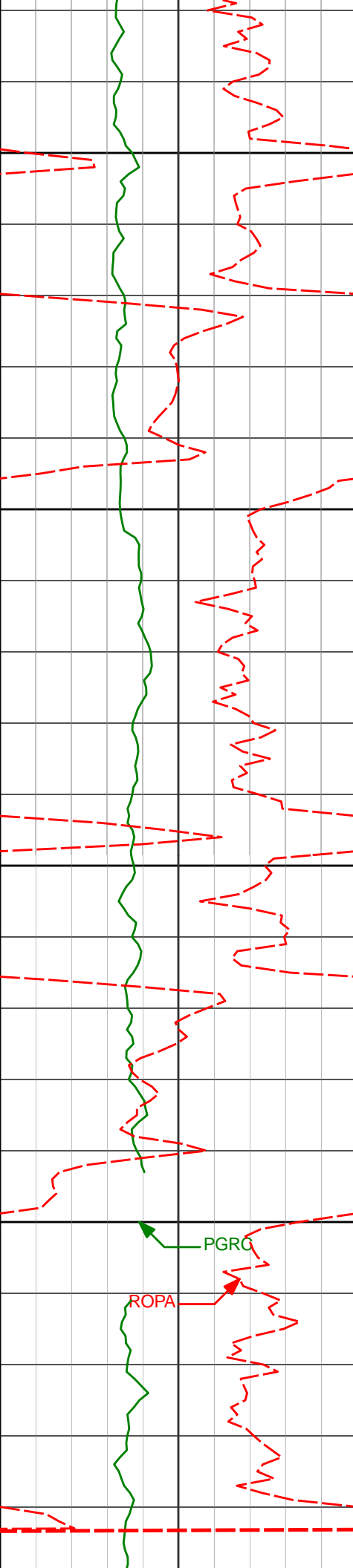
3800

3803'

20.98°

183.34° 3712.35'

-604.88'



3850

3900

3950

4000

3897'

22.17°

187.22° 3799.76'

-639.35'

3992'

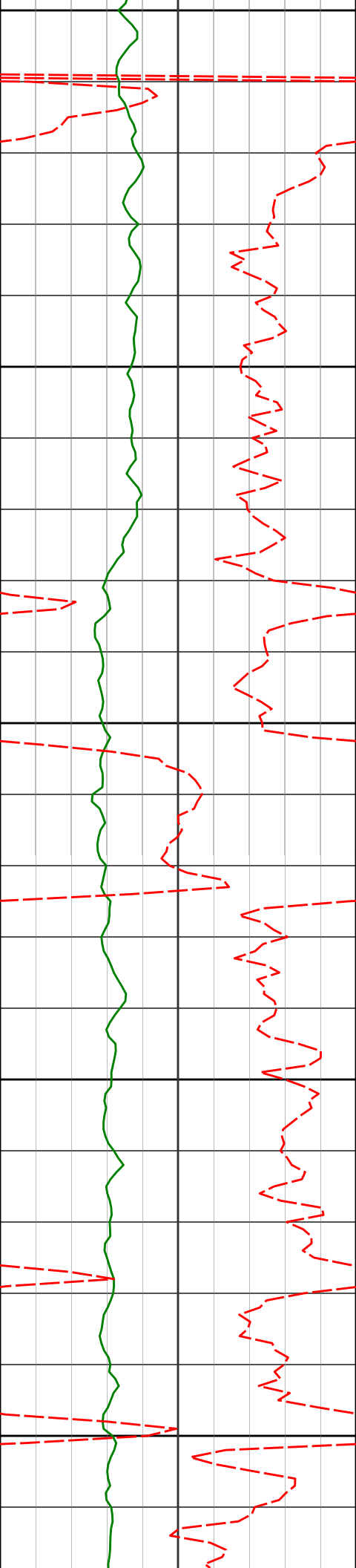
23.49°

186.78° 3887.32'

-676.03'

PGRC

ROPA



4050

4086'

21.11°

185.48° 3974.28'

-711.57'

4100

4150

4181'

23.49°

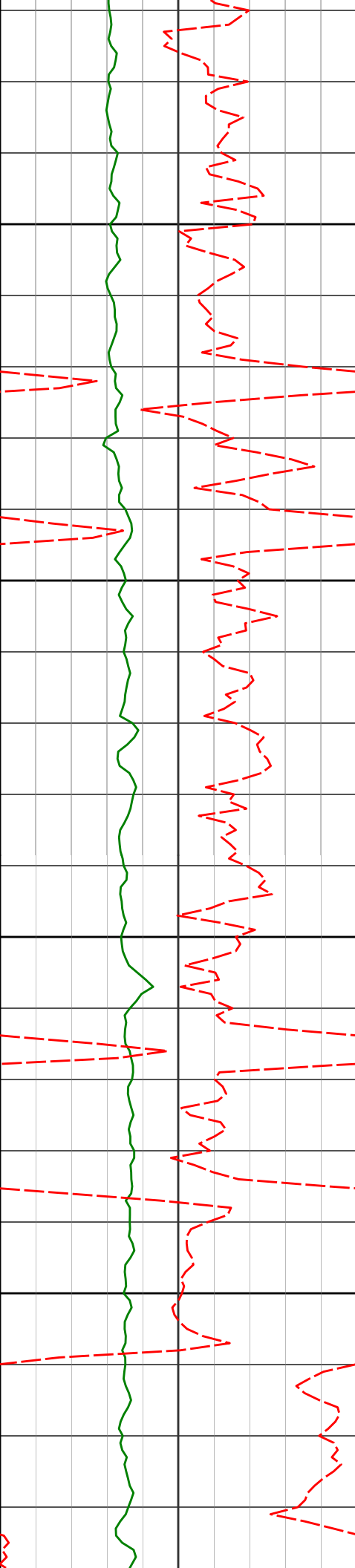
186.13° 4062.17'

-747.51'

4200

4250





4275'

22.82°

185.22° 4148.60'

-784.37'

4300

4350

4369'

21.39°

185.40° 4235.69'

-819.66'

4400

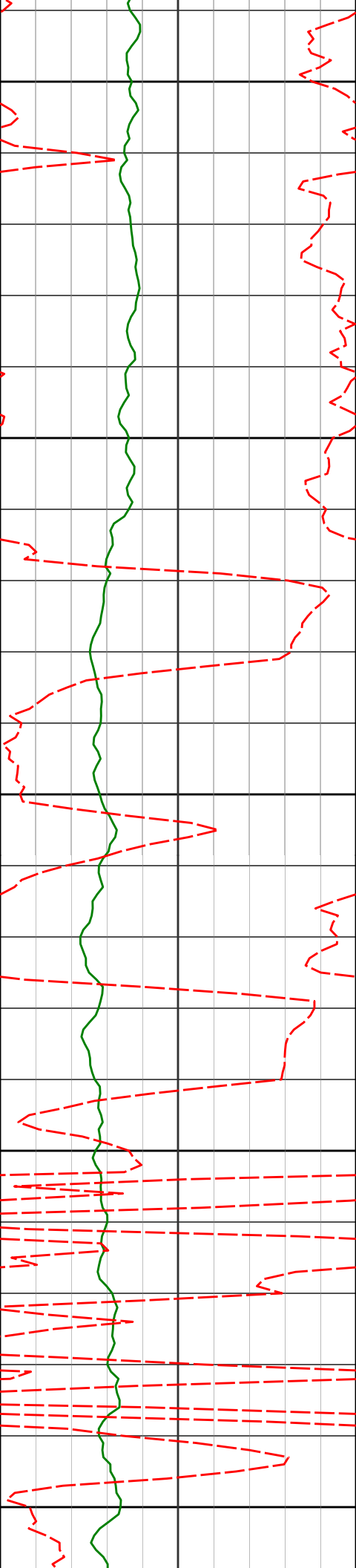
4450

4463'

23.63°

183.09° 4322.52'

-855.60'



4500

4550

4600

4650

4700

4558'

21.48°

182.73° 4410.25'

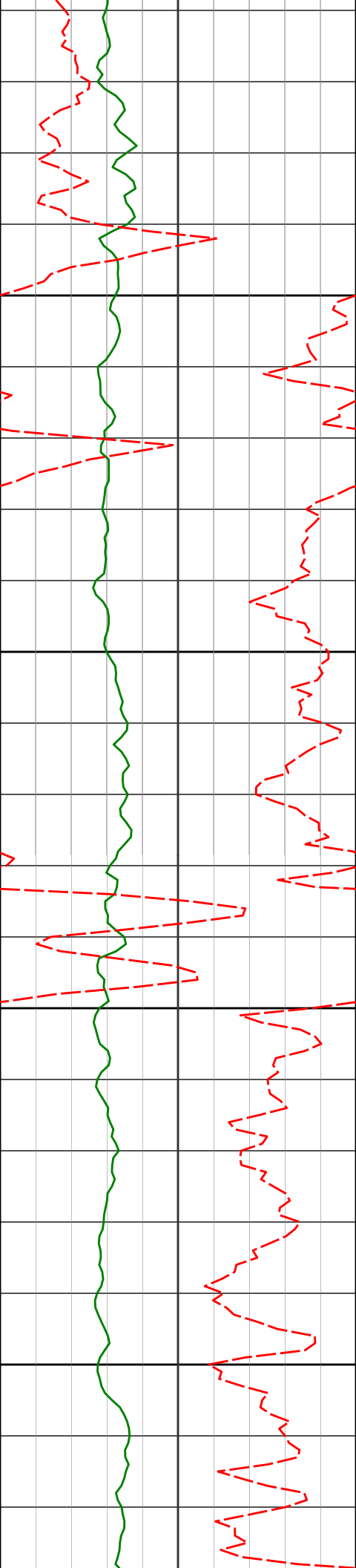
-892.02'

4652'

24.62°

179.57° 4496.74'

-928.81'



4750

4800

4850

4900

4746'

22.89°

178.33° 4582.77'

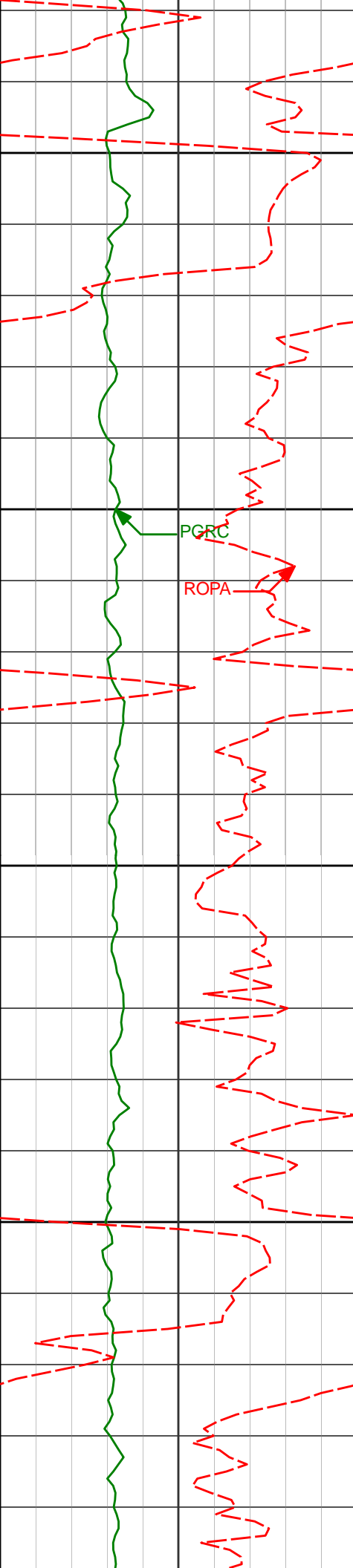
-966.64'

4841'

21.56°

177.27° 4670.71'

-1002.50'



4935' 22.41° 183.68° 4757.89' -1037.63'

4950

5000

PGRC

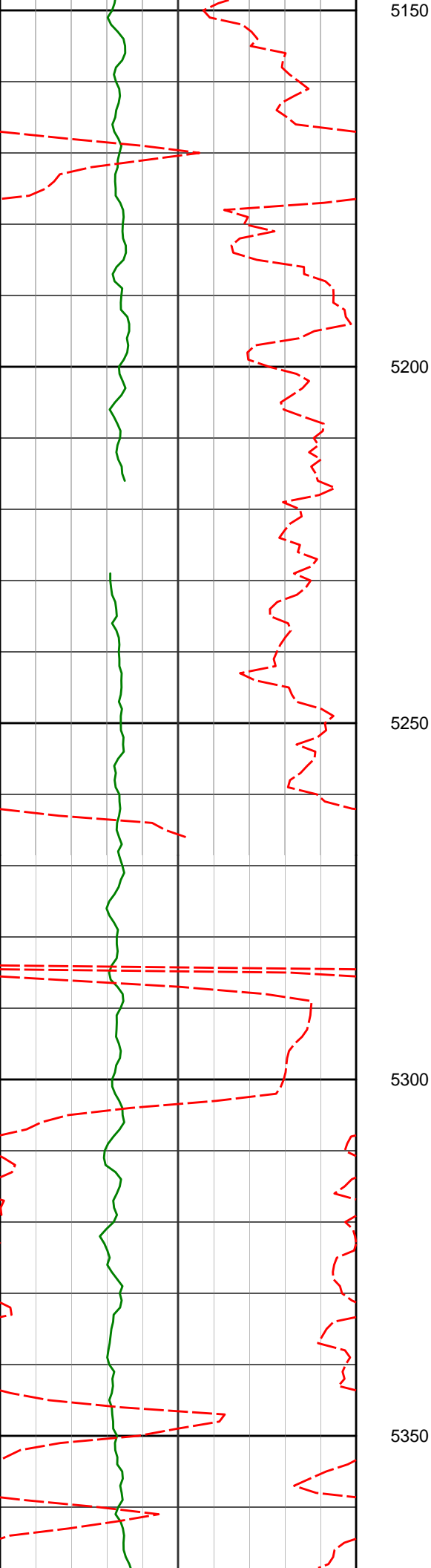
ROPA

5030' 20.80° 183.25° 4846.21' -1072.59'

5050

5100

5124' 21.57° 182.59° 4933.86' -1106.55'



5218'

20.13°

182.70°

5021.70'

-1139.99'

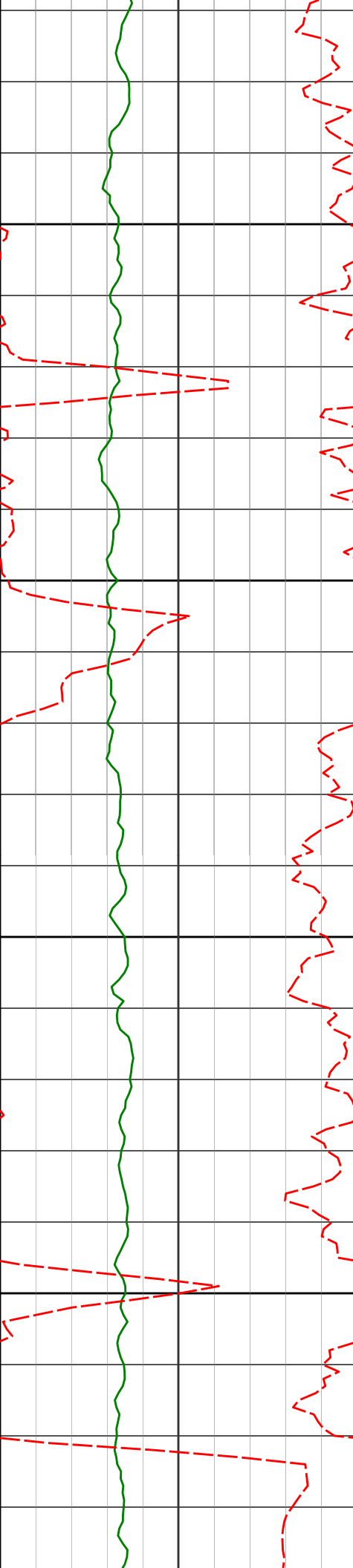
5313'

21.59°

180.99°

5110.47'

-1173.82'



5400

5450

5500

5550

5407'

20.83°

181.60° 5198.11'

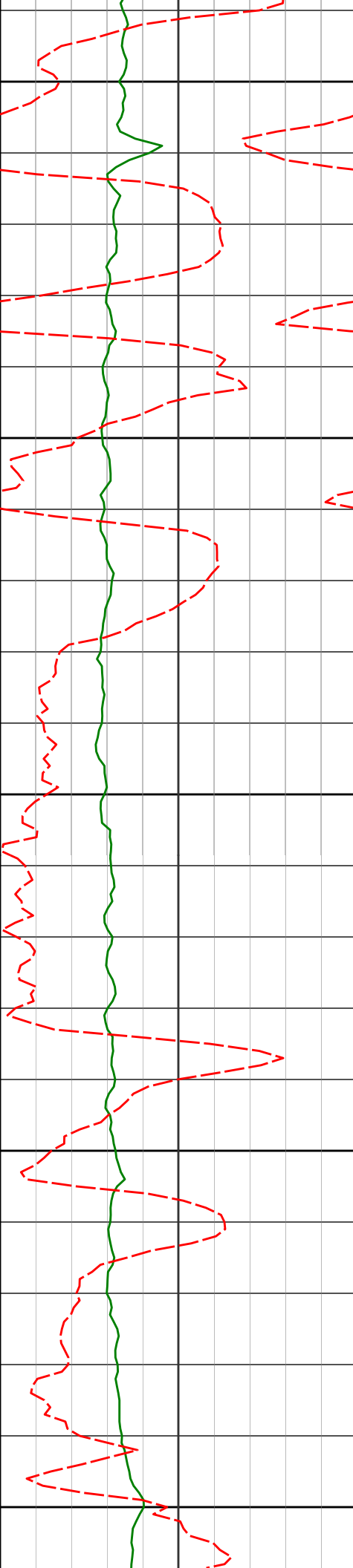
-1207.82'

5502'

19.52°

181.26° 5287.27'

-1240.59'



5596'

20.85°

179.96° 5375.50'

-1273.02'

5600

5650

5690'

19.26°

180.69° 5463.80'

-1305.24'

5700

5750

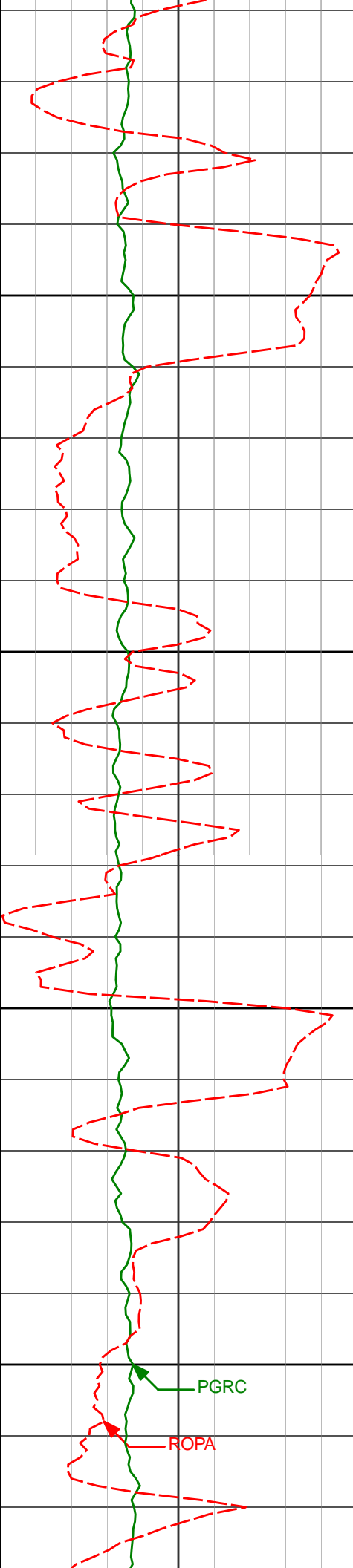
5784'

17.39°

180.13° 5553.03'

-1334.79'

5800



5850

5900

5950

6000

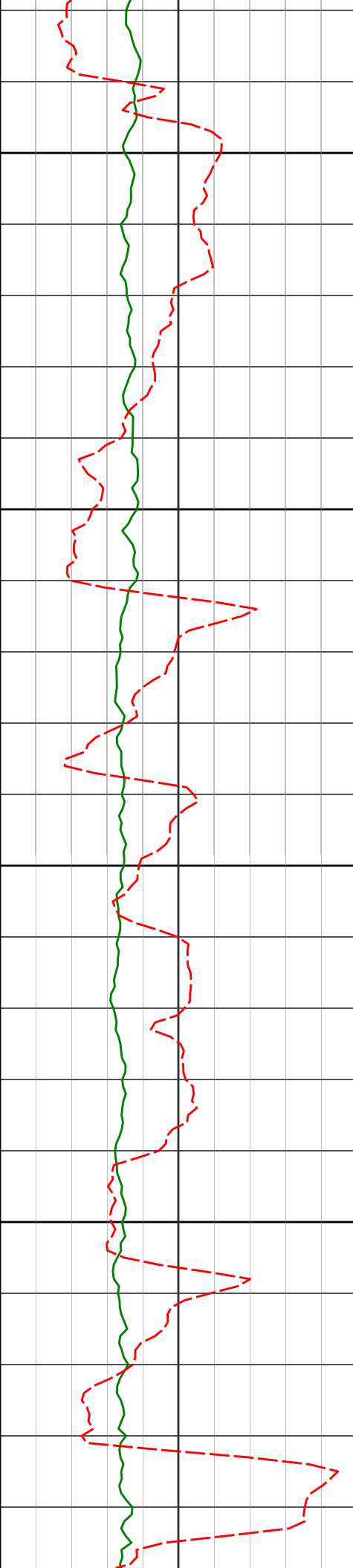
5879'      18.16°      176.95°    5643.49'    -1363.75'

5973'      18.25°      177.75°    5732.79'    -1393.04'

PGRC

ROPA





6050

6067'

16.74°

176.10° 5822.44'

-1421.21'

6100

6150

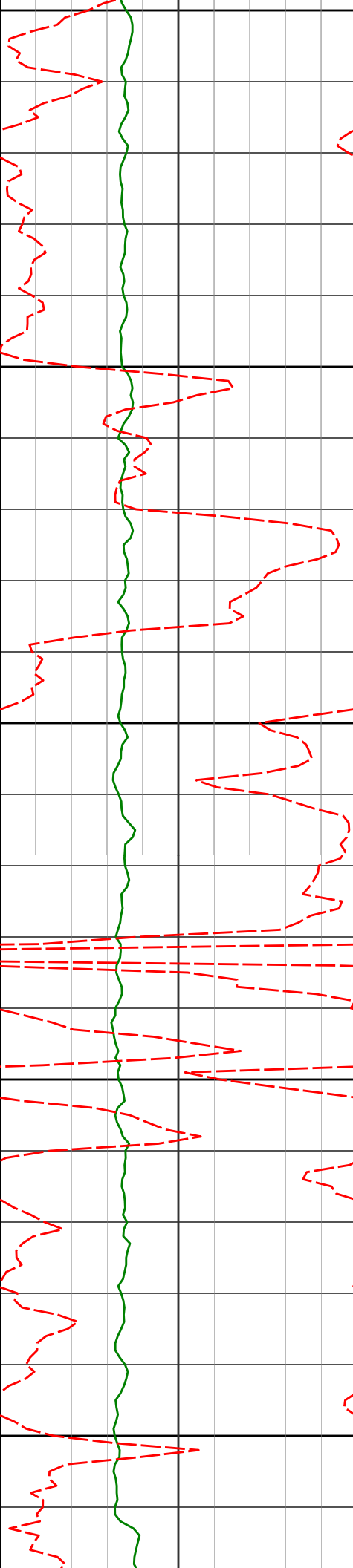
6162'

15.02°

174.31° 5913.81'

-1447.05'

6200



6250

6256'

12.59°

176.26° 6005.09'

-1469.34'

6300

6350

6351'

10.20°

184.28° 6098.21'

-1488.06'

6400

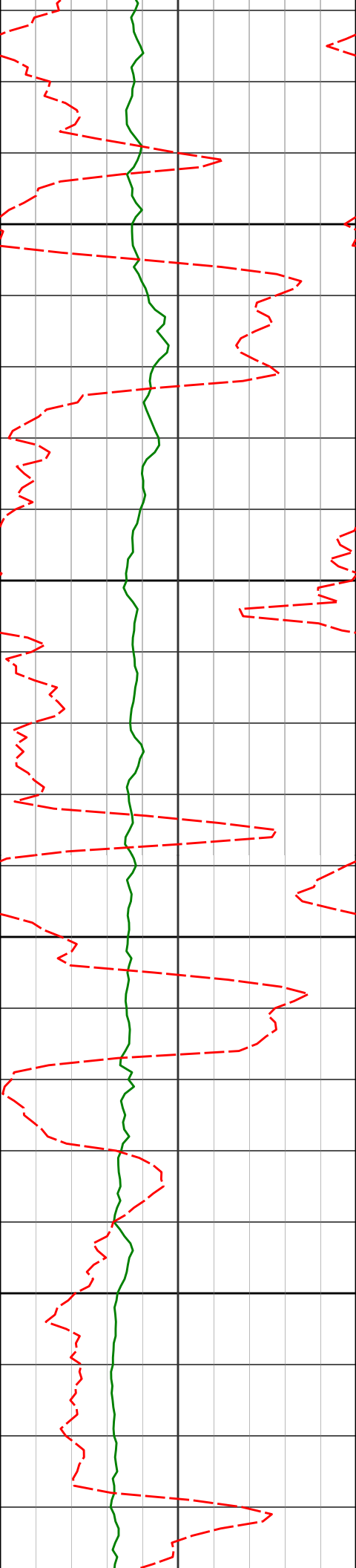
6450

6445'

9.29°

183.38° 6190.86'

-1503.95'



6500

6550

6600

6650

6539'

5.85°

185.58° 6284.02'

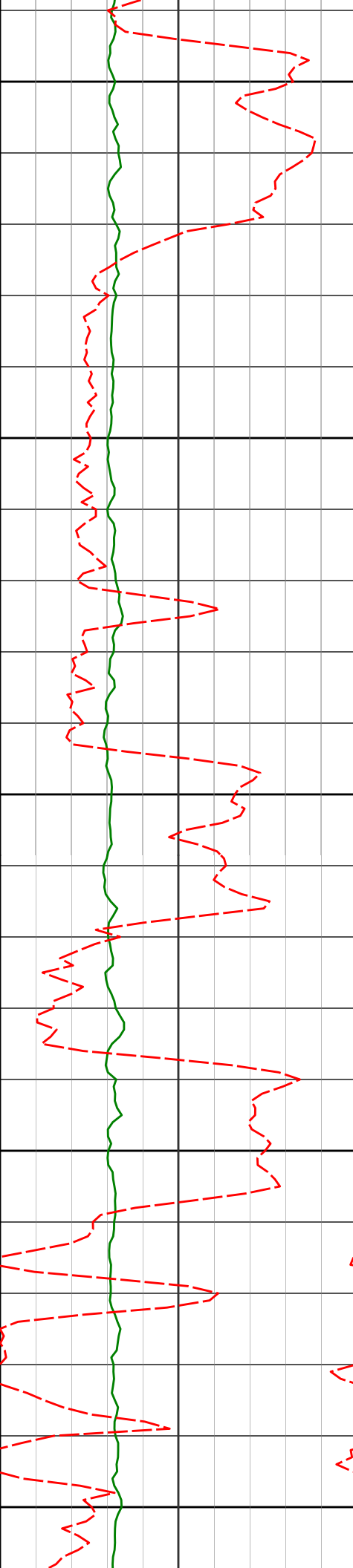
-1516.32'

6633'

3.98°

186.53° 6377.67'

-1524.35'



6700

6750

6800

6850

6900

6728'

2.94°

191.52° 6472.50'

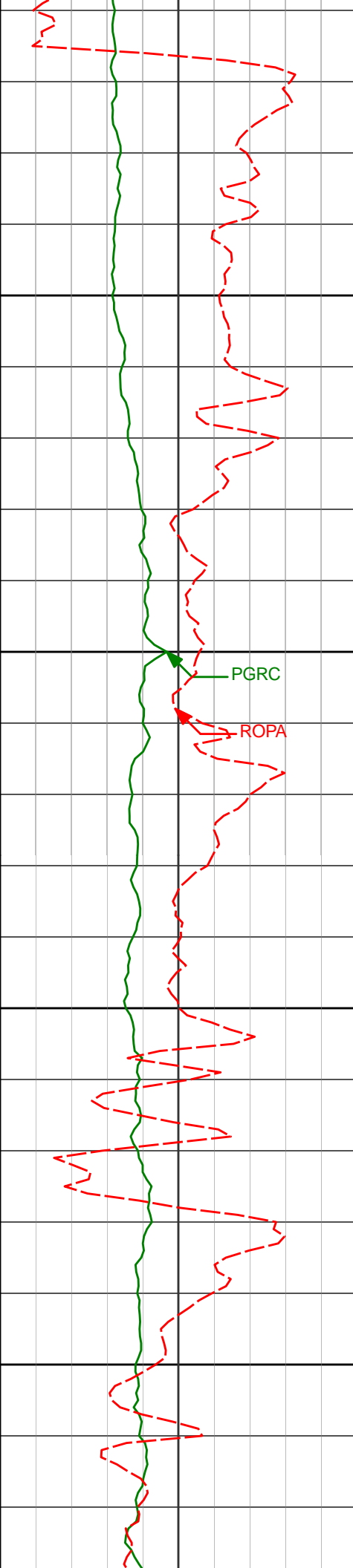
-1530.03'

6822'

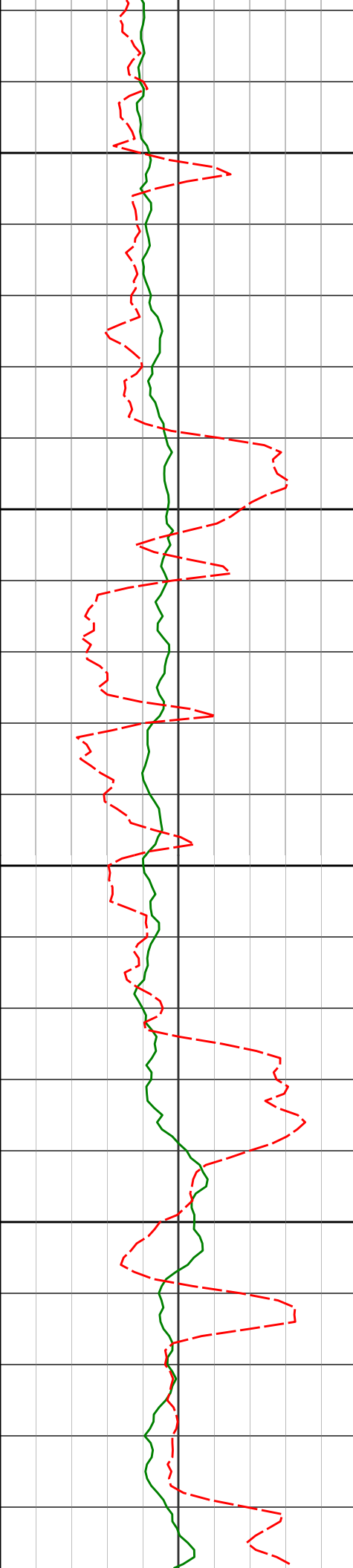
0.26°

93.29° 6566.46'

-1532.41'



6916'	2.03°	350.07°	6660.44'	-1530.78'
6950				
6963'	6.52°	0.16°	6707.30'	-1527.30'
7000				
7011'	15.63°	4.85°	6754.35'	-1518.10'
7050				
7058'	23.99°	2.97°	6798.53'	-1502.20'
7100				
7105'	28.13°	359.65°	6840.75'	-1481.56'



7150

7152'

27.80°

358.95° 6882.26'

-1459.54'

7200

7199'

27.40°

358.34° 6923.91'

-1437.79'

7250

7246'

26.78°

359.81° 6965.76'

-1416.41'

7300

7293'

27.58°

359.72° 7007.57'

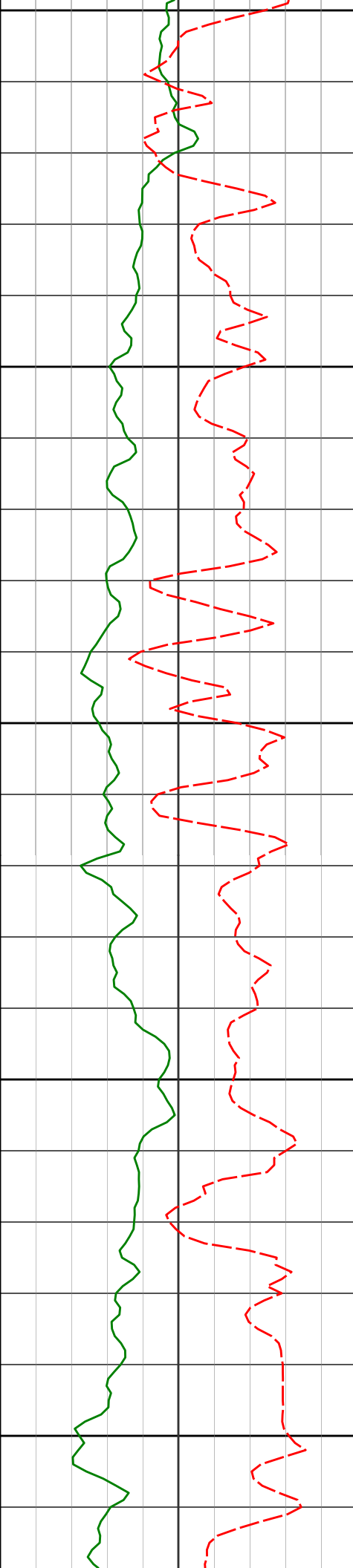
-1394.95'

7340'

28.37°

0.40° 7049.07'

-1372.91'



7350

7387'

36.00°

350.62° 7088.85'

-1348.12'

7400

7434'

44.24°

353.61° 7124.76'

-1318.25'

7450

7482'

50.66°

354.44° 7157.21'

-1283.20'

7500

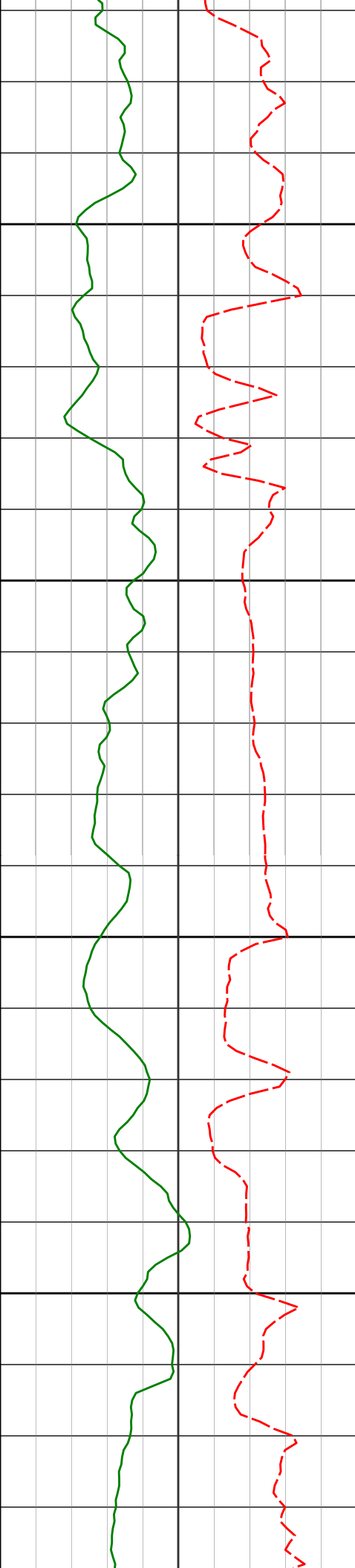
7529'

55.82°

356.17° 7185.33'

-1245.78'

7550



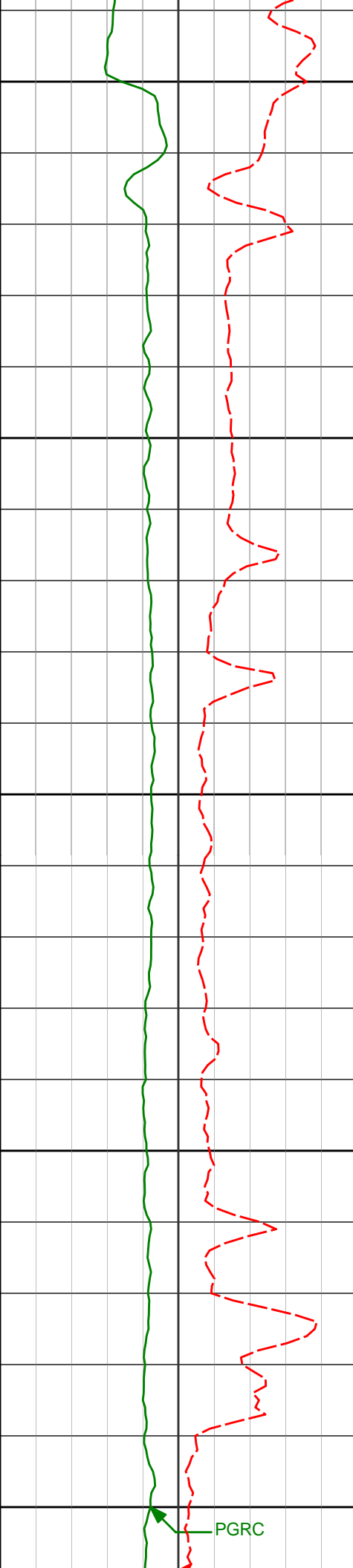
7600

7650

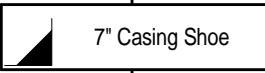
7700

7750





7800



Run 200

7818'

90.12°

5.72° 7262.74'

-973.18'

7850

7900

7913'

90.62°

5.96° 7262.13'

-878.47'

7950

8000

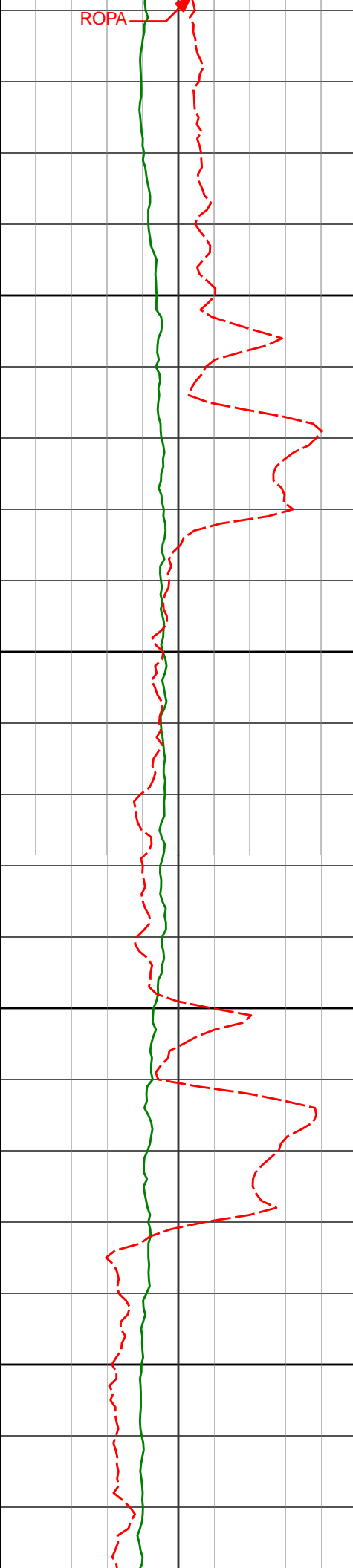
PGRC

8007'

89.48°

5.06° 7262.04'

-784.71'



ROPA

8050

8100

8150

8200

8101'

90.40°

3.69° 7262.14'

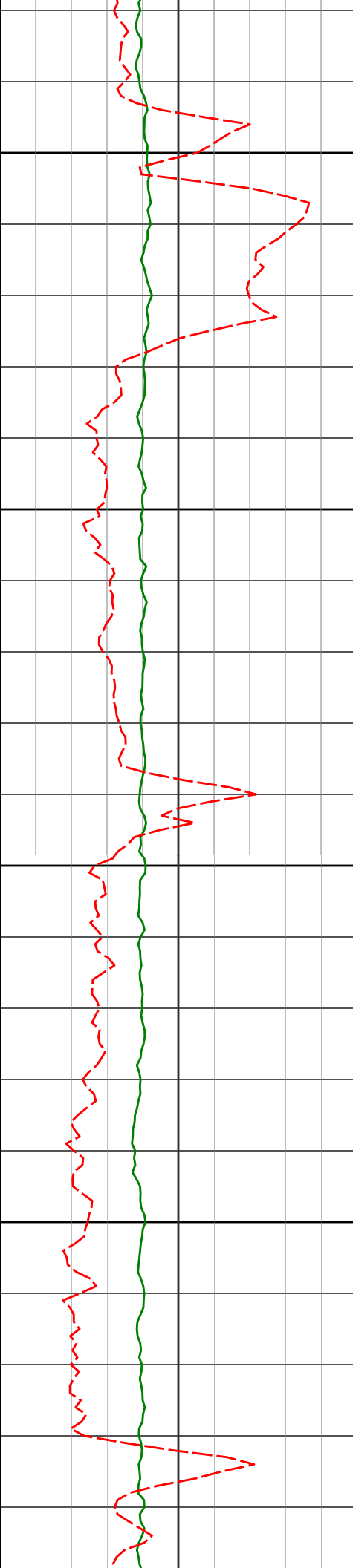
-690.84'

8195'

91.02°

2.36° 7260.98'

-596.89'



8250

8300

8350

8400

8290'

89.26°

1.09° 7260.75'

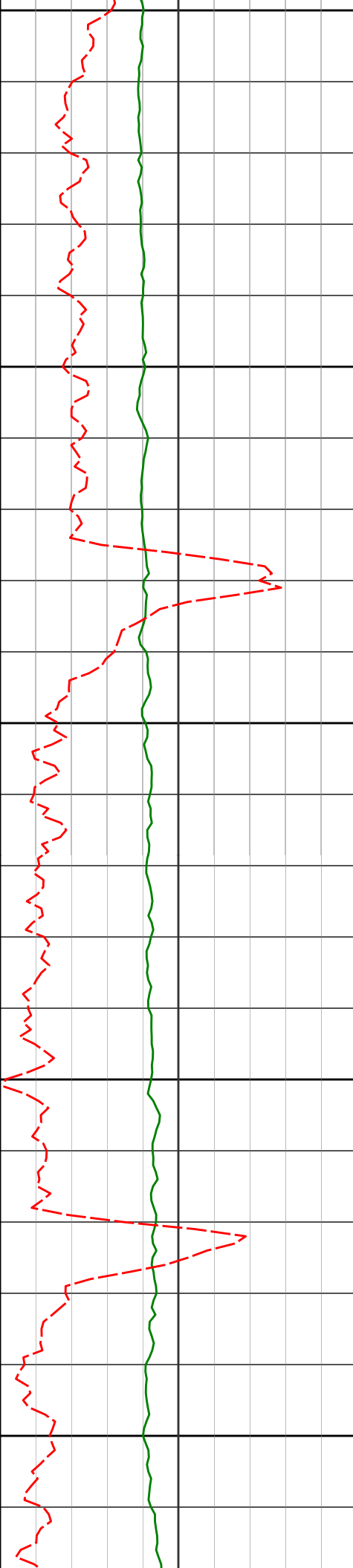
-501.89'

8385'

89.72°

1.31° 7261.59'

-406.90'



8450

8479'

89.97°

1.03° 7261.85'

-312.90'

8500

8550

8573'

90.00°

1.34° 7261.87'

-218.90'

8600

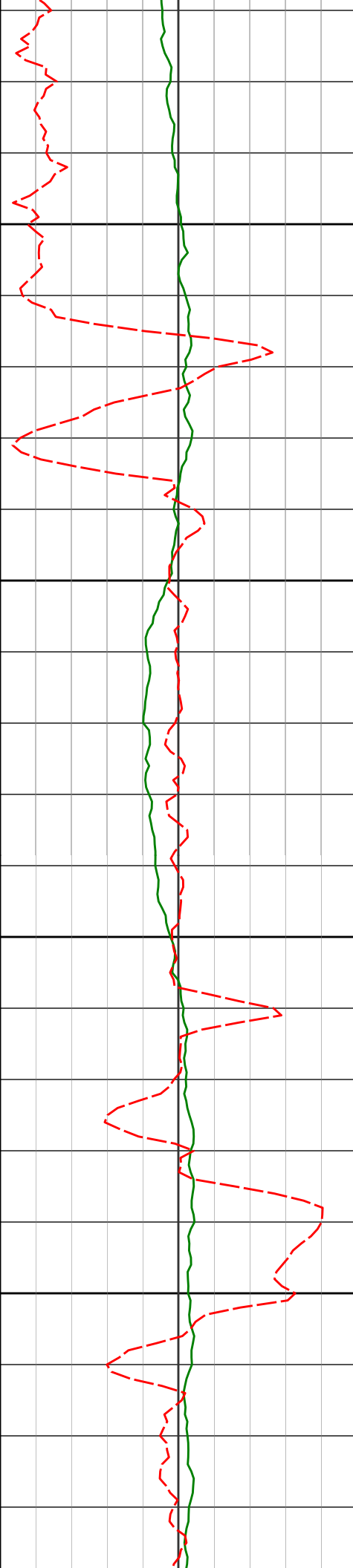
8650

8667'

90.62°

1.31° 7261.36'

-124.90'



8700

8750

8800

8850

8762'

91.14°

1.42° 7259.90'

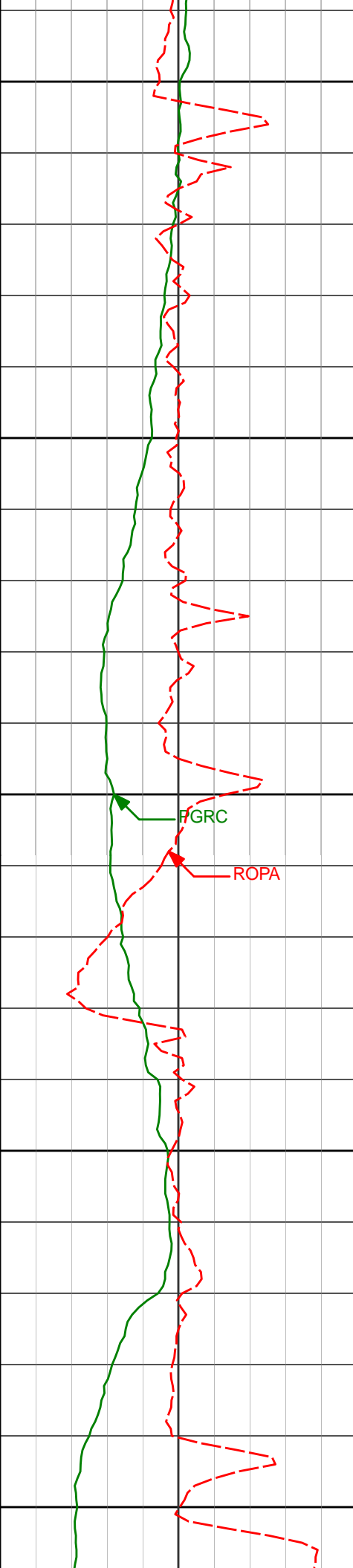
-29.91'

8856'

90.06°

1.12° 7258.92'

64.08'



8900

8950

9000

9050

9100

8950'

90.52°

0.96° 7258.44'

158.08'

9045'

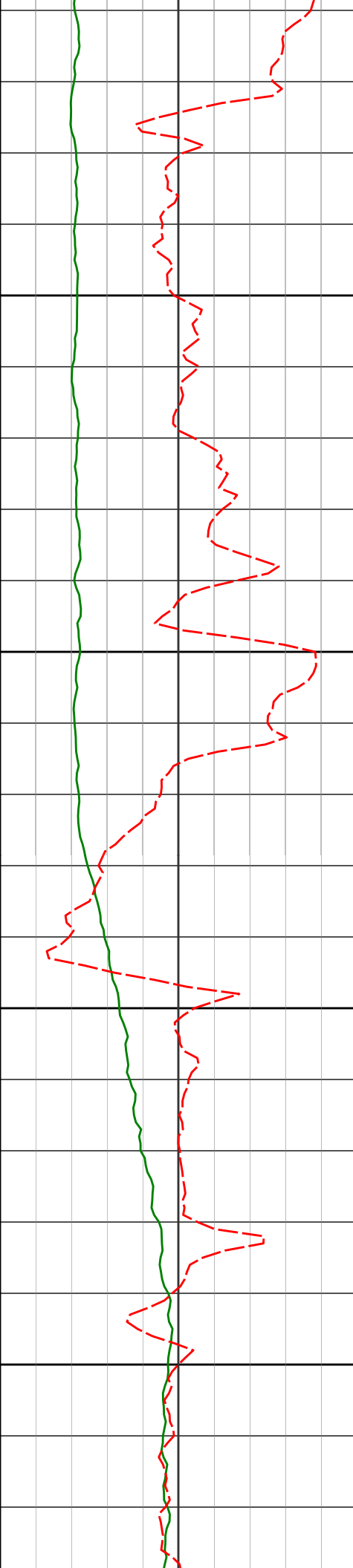
91.20°

1.23° 7257.02'

253.06'

FGRC

ROPA



9139'

89.63°

1.34° 7256.34'

347.06'

9150

9200

9233'

88.55°

1.65° 7257.83'

441.04'

9250

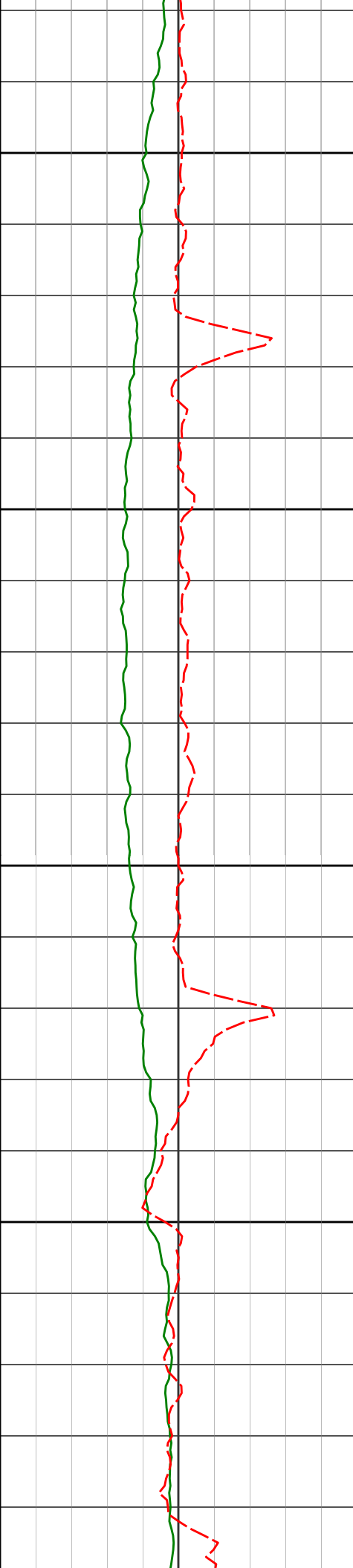
9300

9328'

88.98°

1.71° 7259.88'

536.02'



9350

9400

9450

9500

9422'

89.60°

1.73° 7261.04'

630.01'

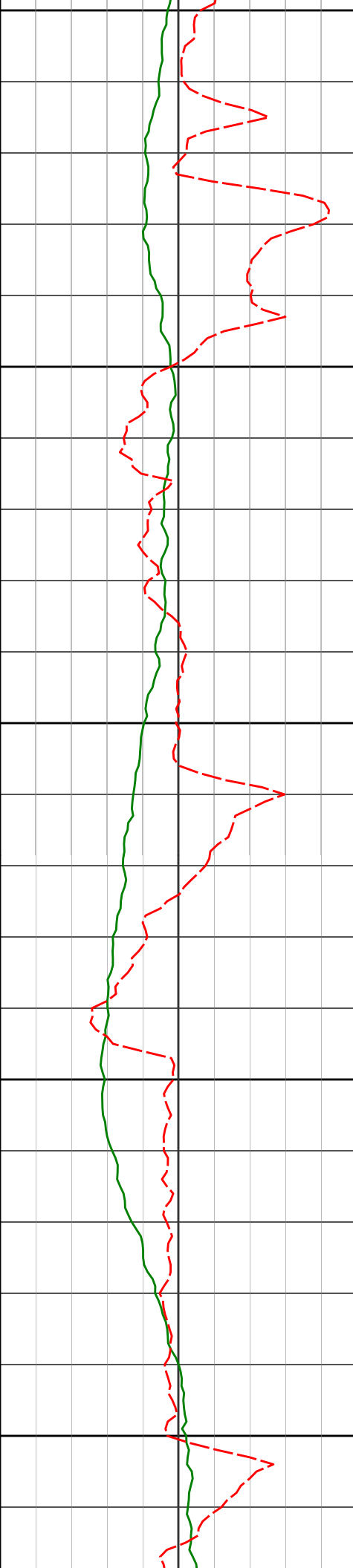
9517'

90.28°

2.24° 7261.14'

725.01'





9550

9600

9650

9700

9750

9611'

88.71°

1.19° 7261.97'

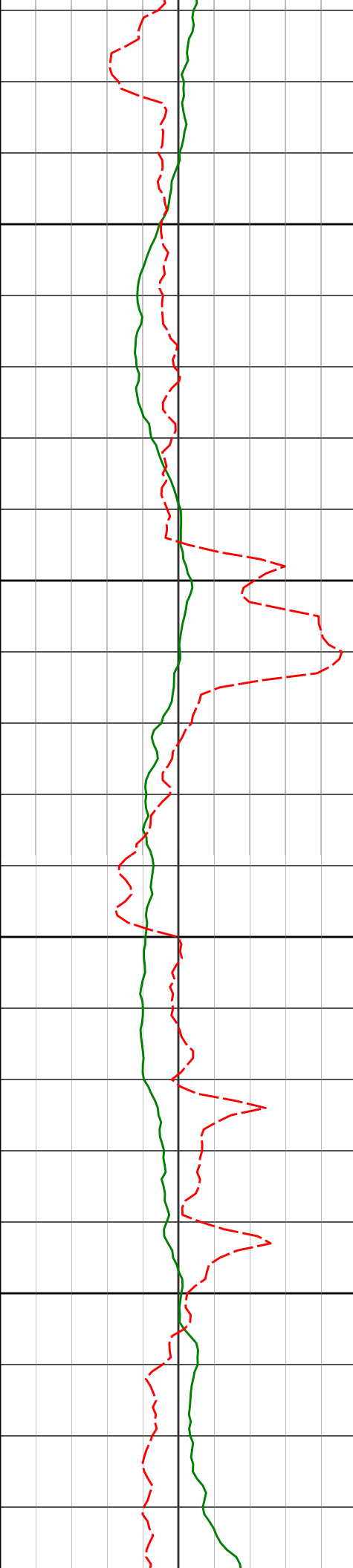
819.00'

9706'

88.64°

1.75° 7264.17'

913.97'



9800

9850

9900

9950

9800'

9894'

88.74°

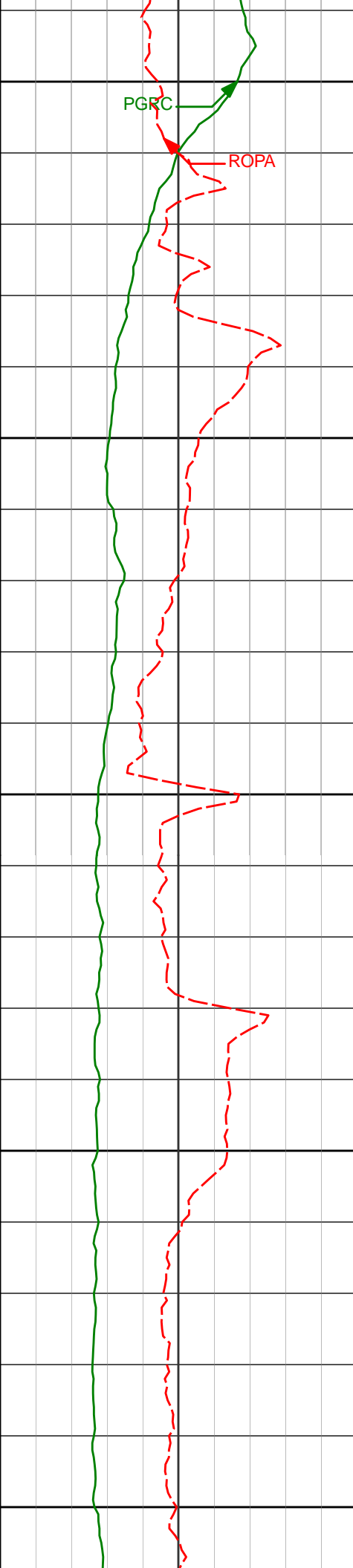
89.14°

1.81° 7266.31'

1.56° 7268.05'

1007.94'

1101.93'



10000

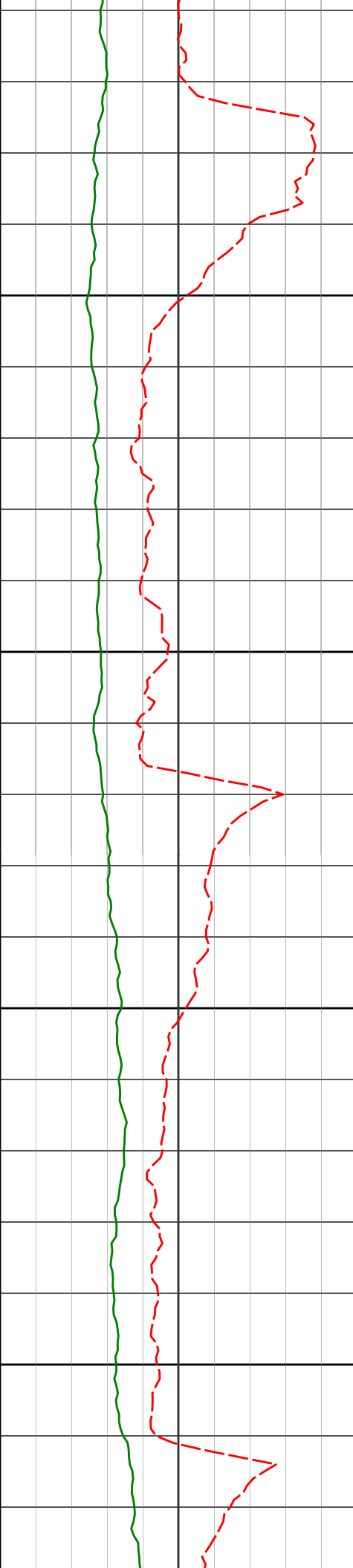
10050

10100

10150

10200

9989'	89.23°	1.77°	7269.40'	1196.92'
10083'	88.95°	2.46°	7270.90'	1290.90'
10177'	89.04°	2.12°	7272.55'	1384.87'



10250

10300

10350

10400

10271'

91.29°

3.15° 7272.28'

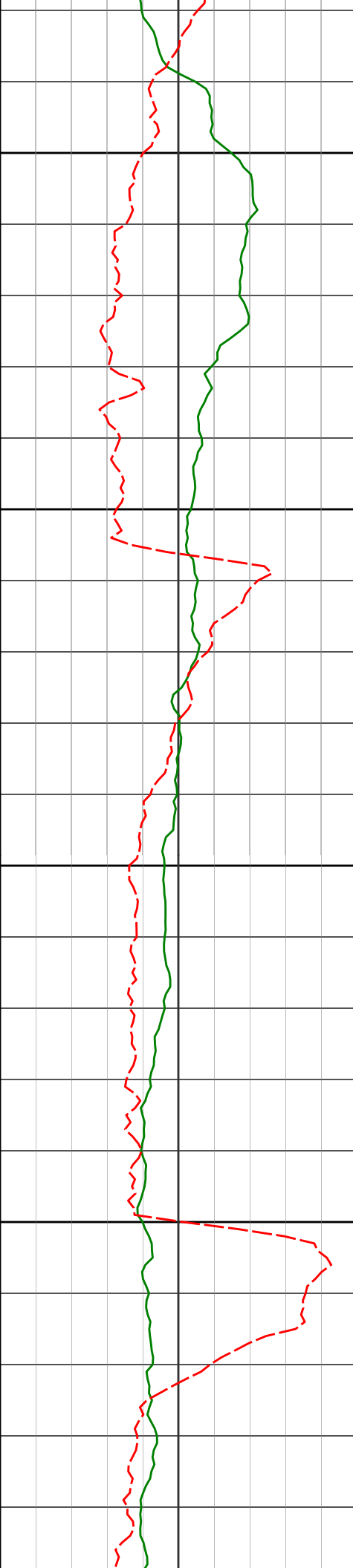
1478.84'

10366'

91.36°

2.77° 7270.08'

1573.78'



10450

10460'

91.51°

3.00° 7267.73'

1667.72'

10500

10550

10554'

91.42°

2.95° 7265.32'

1761.66'

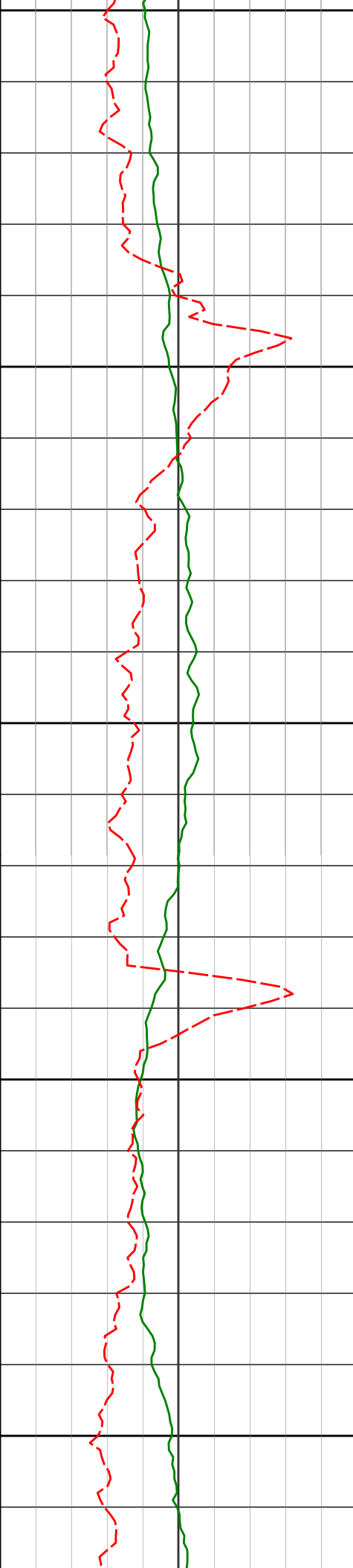
10600

10646'

90.65°

1.98° 7263.66'

1853.63'



10650

10700

10750

10800

10850

10737'

90.46°

2.01° 7262.78'

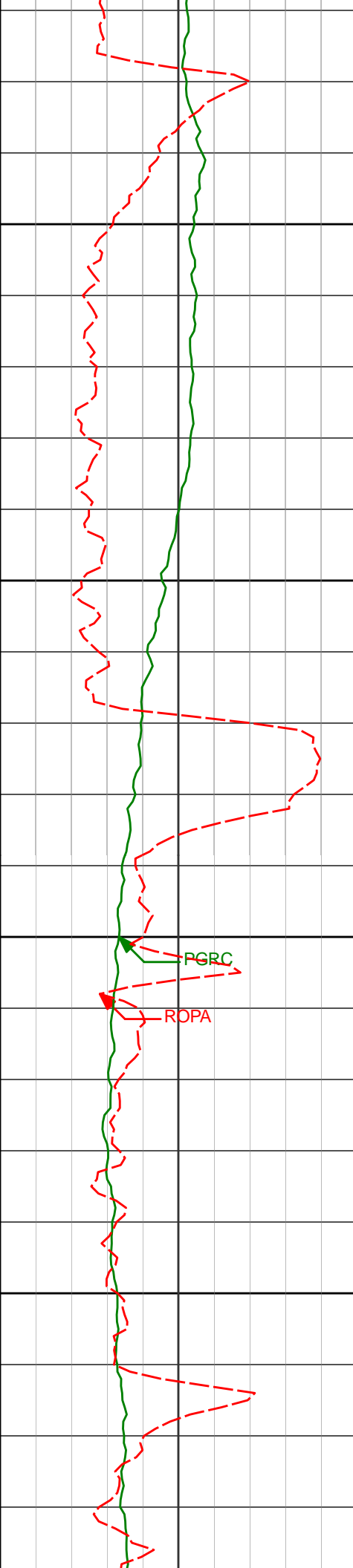
1944.62'

10829'

90.96°

2.00° 7261.64'

2036.60'



10900

10950

11000

11050

10921'

90.93°

2.20° 7260.12'

2128.58'

11012'

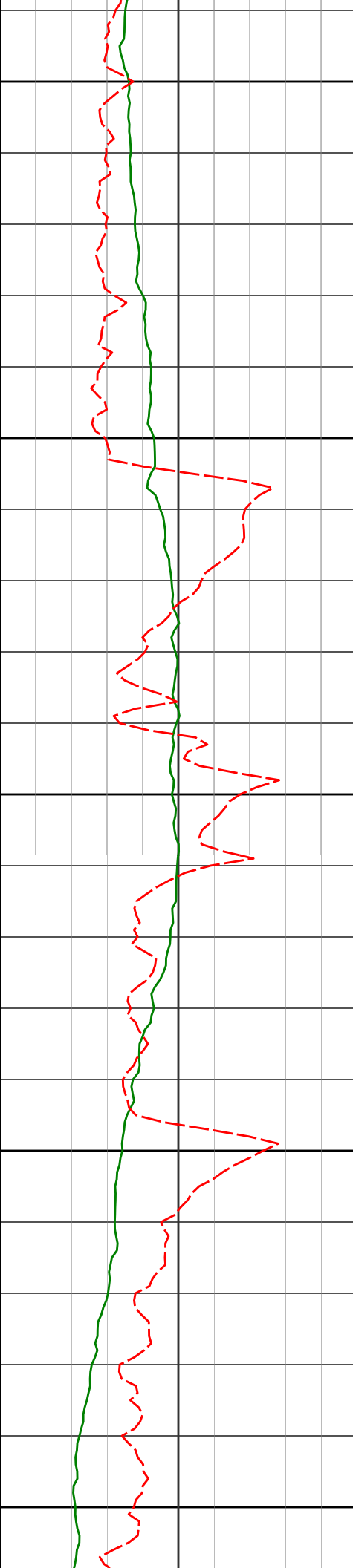
90.80°

2.09° 7258.75'

2219.57'

PGRC

ROPA



11100

11103'

90.77°

2.09° 7257.50'

2310.55'

11150

11200

11195'

91.14°

2.08° 7255.97'

2402.53'

11250

11300

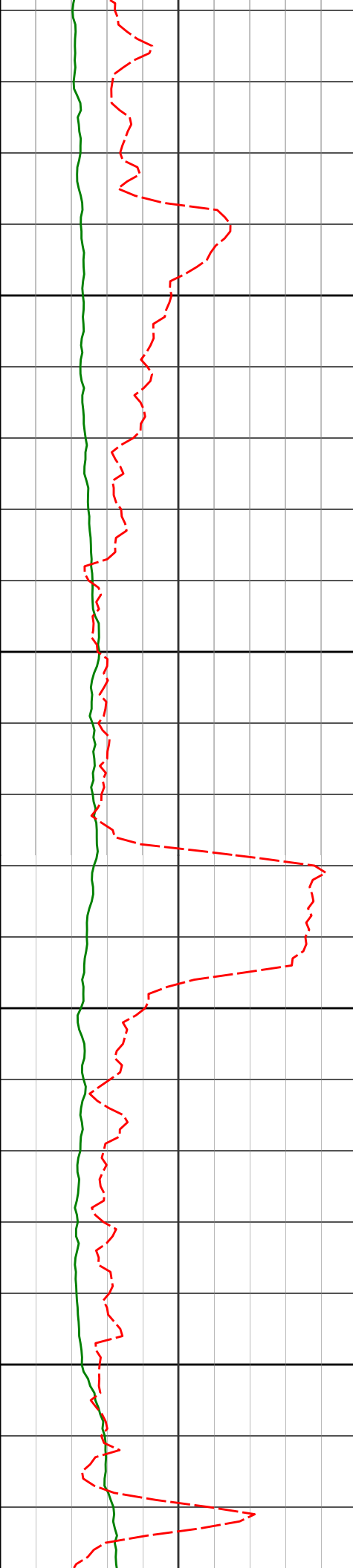
11286'

91.39°

1.64° 7253.96'

2493.51'





11350

11378'

91.14°

1.94° 7251.93'

2585.48'

11400

11450

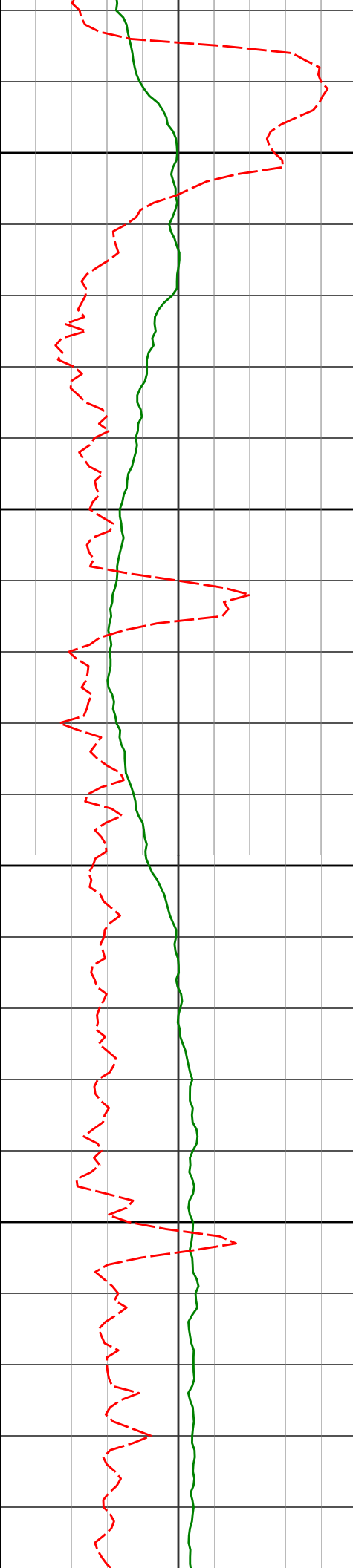
11470'

89.69°

1.74° 7251.26'

2677.48'

11500



11550

11562'

88.55°

1.41° 7252.67'

2769.46'

11600

11650

11655'

88.86°

1.67° 7254.78'

2862.44'

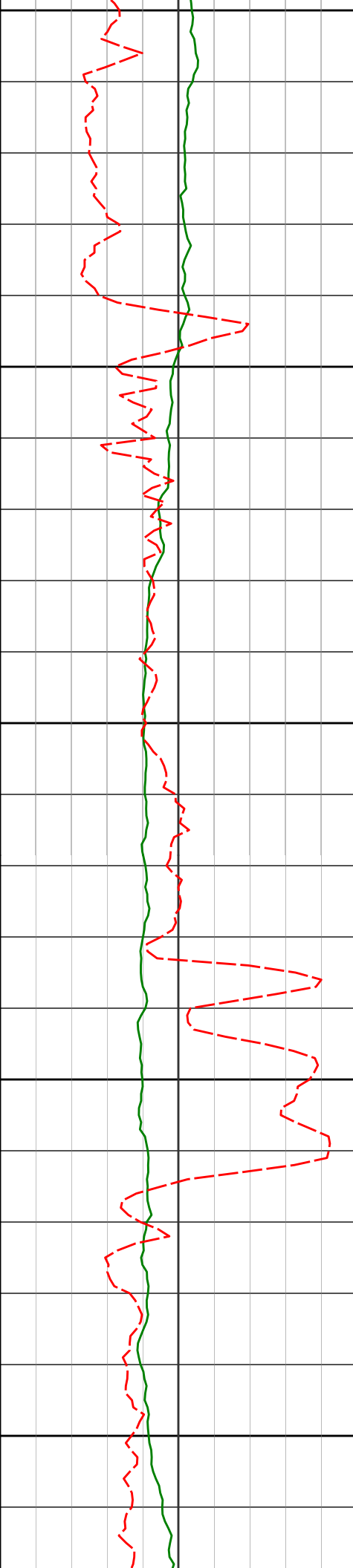
11700

11748'

89.11°

1.79° 7256.42'

2955.42'



11750

11800

11850

11900

11950

11841'

88.80°

1.57° 7258.12'

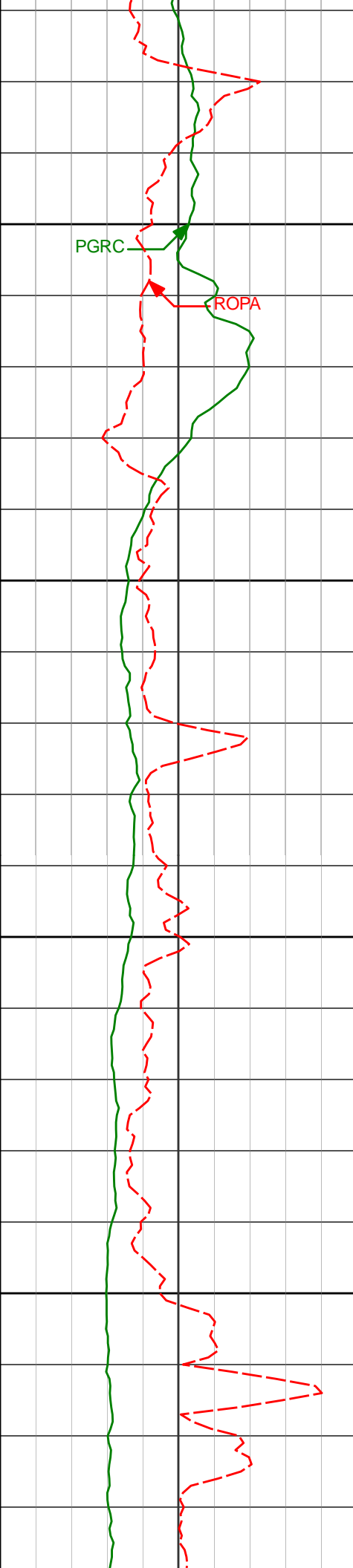
3048.41'

11932'

90.00°

0.81° 7259.07'

3139.40'



12000

PGRC

ROPA

12050

12100

12150

12024'

90.37°

0.95° 7258.78'

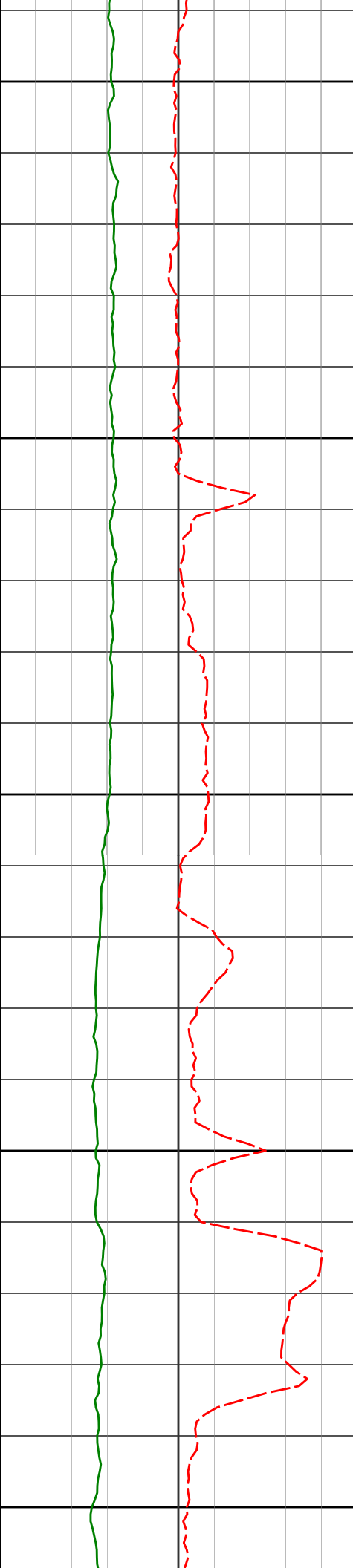
3231.39'

12117'

90.22°

1.08° 7258.30'

3324.39'



12200

12209'

90.62°

2.22° 7257.62'

3416.39'

12250

12300

12300'

90.80°

3.86° 7256.49'

3507.34'

12350

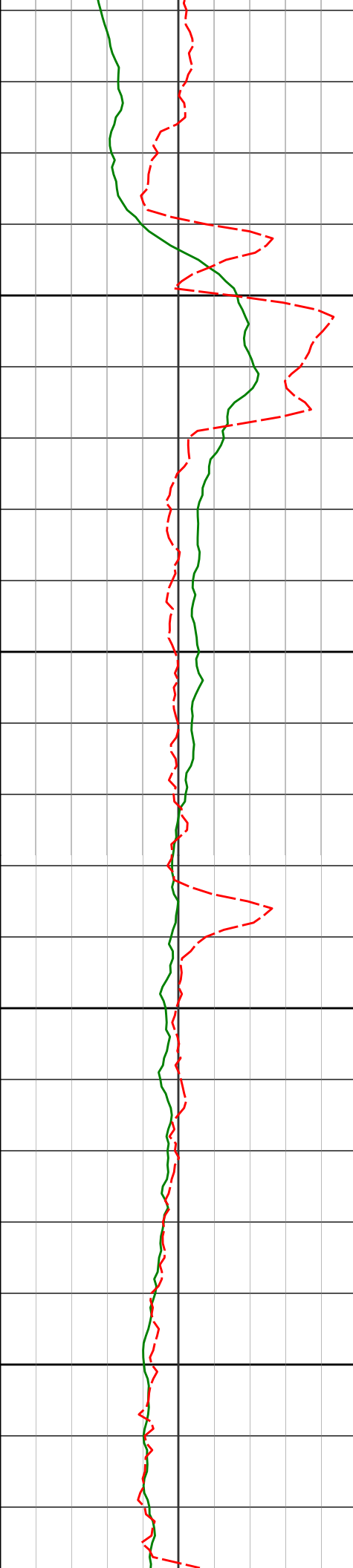
12400

12392'

91.48°

1.62° 7254.66'

3599.29'



12450

12486'

90.15°

0.31° 7253.33'

3693.27'

12500

12550

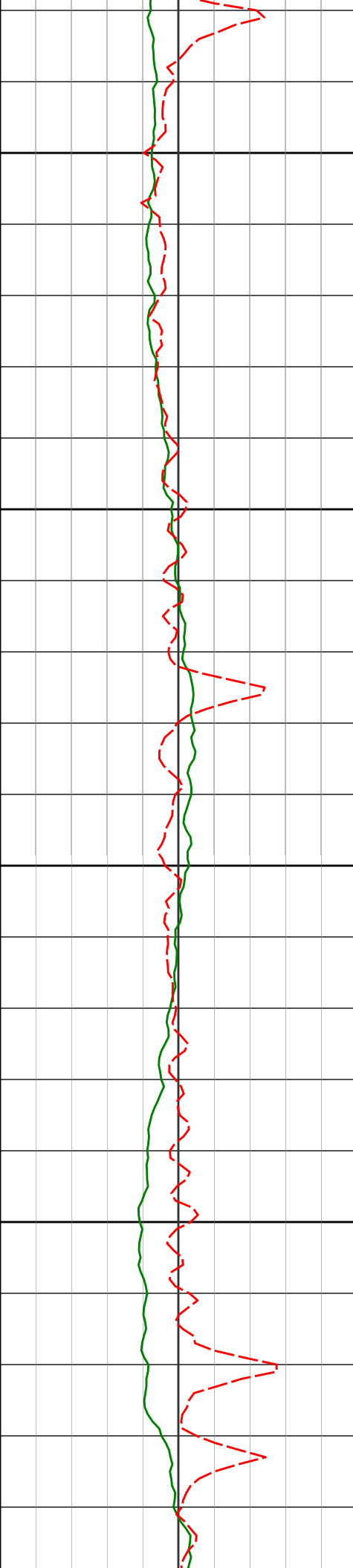
12581'

90.37°

0.50° 7252.90'

3788.26'

12600



12650

12675'

90.68°

0.74° 7252.03'

3882.24'

12700

12750

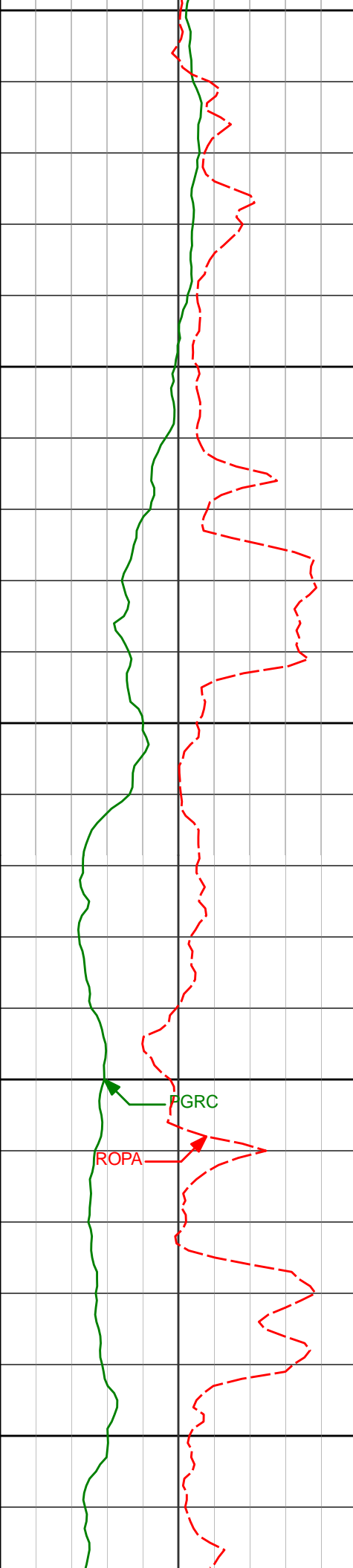
12769'

91.05°

0.88° 7250.62'

3976.23'

12800



12850

12864'

91.17°

1.06° 7248.77'

4071.21'

12900

12950

12958'

91.02°

0.53° 7246.98'

4165.18'

13000

FGRC

ROPA

13050

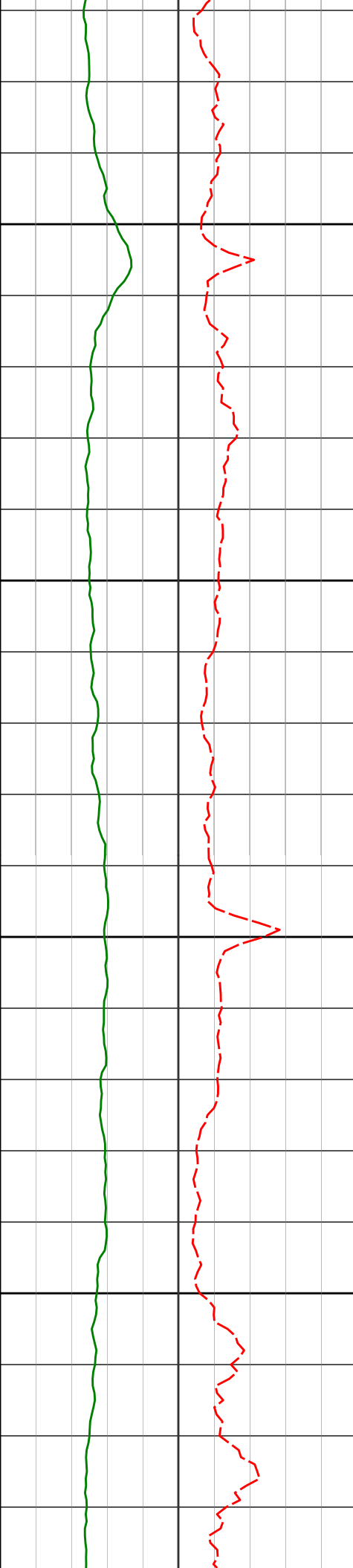
13053'

89.69°

0.58° 7246.39'

4260.17'





13100

13150

13200

13250

13148'

89.78°

0.54° 7246.83'

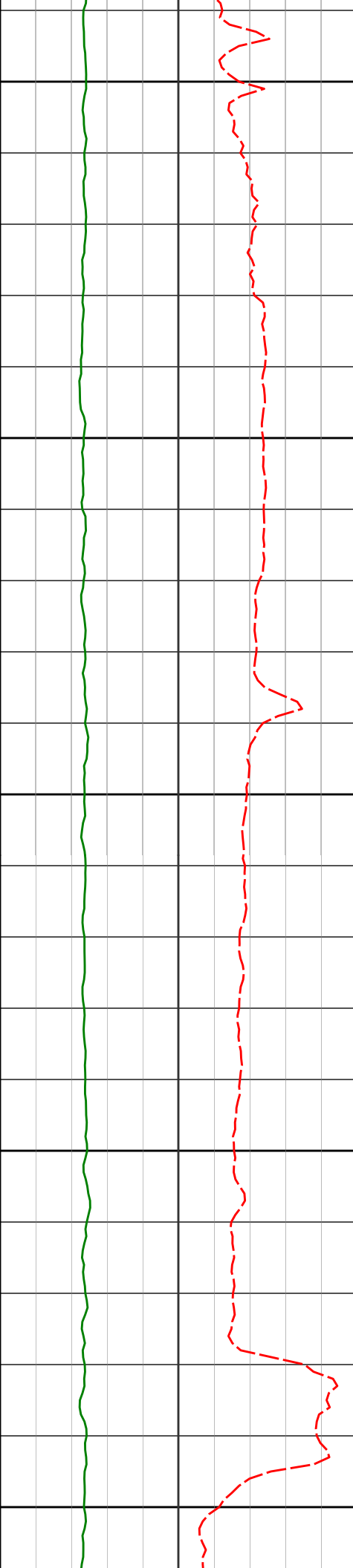
4355.16'

13242'

89.85°

0.50° 7247.13'

4449.15'



13300

13350

13400

13450

13500

13337'

89.82°

0.32° 7247.41'

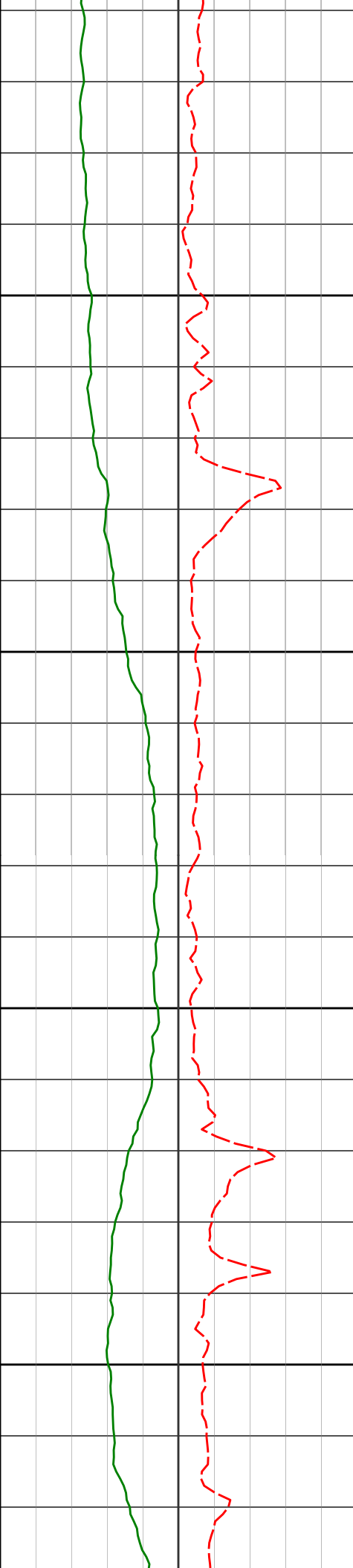
4544.13'

13431'

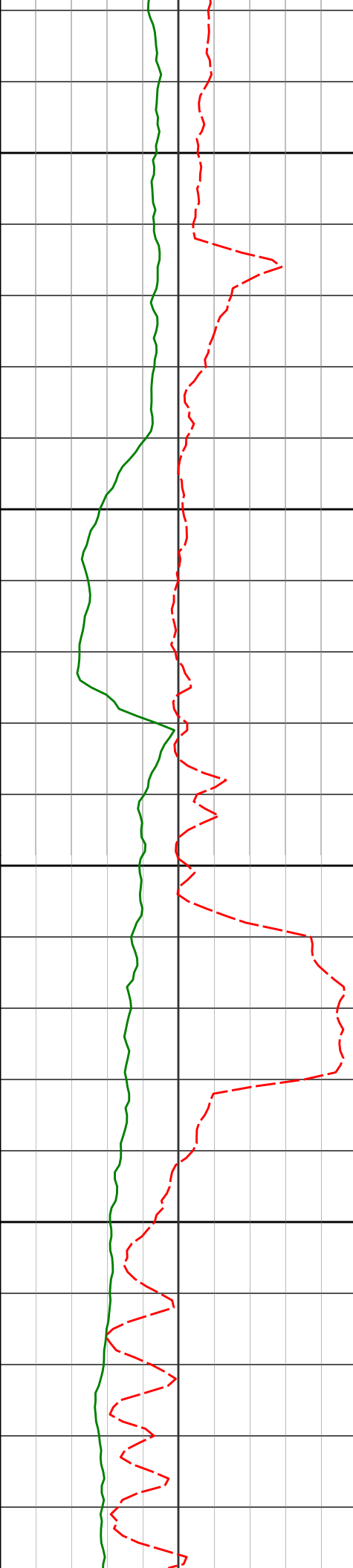
90.03°

0.73° 7247.53'

4638.12'



13526'	89.45°	0.33°	7247.96'	4733.11'
13550				
13600				
13620'	89.54°	0.32°	7248.79'	4827.08'
13650				
13700				
13715'	89.97°	0.36°	7249.20'	4922.07'



13750

13800

13850

13900

13809'

90.25°

0.33° 7249.02'

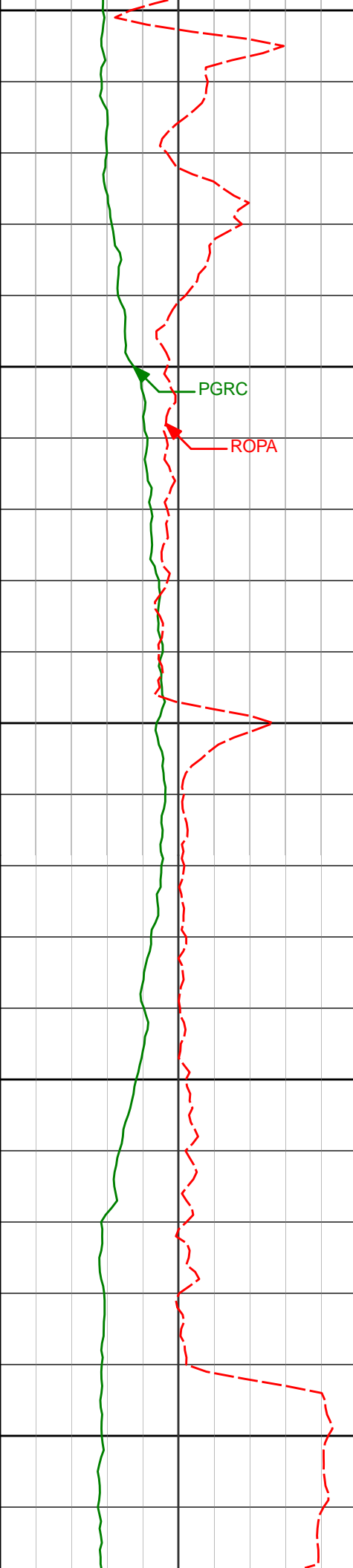
5016.05'

13903'

89.48°

0.69° 7249.24'

5110.04'



13950

14000

14050

14100

14150

13998'

89.41°

0.81° 7250.16'

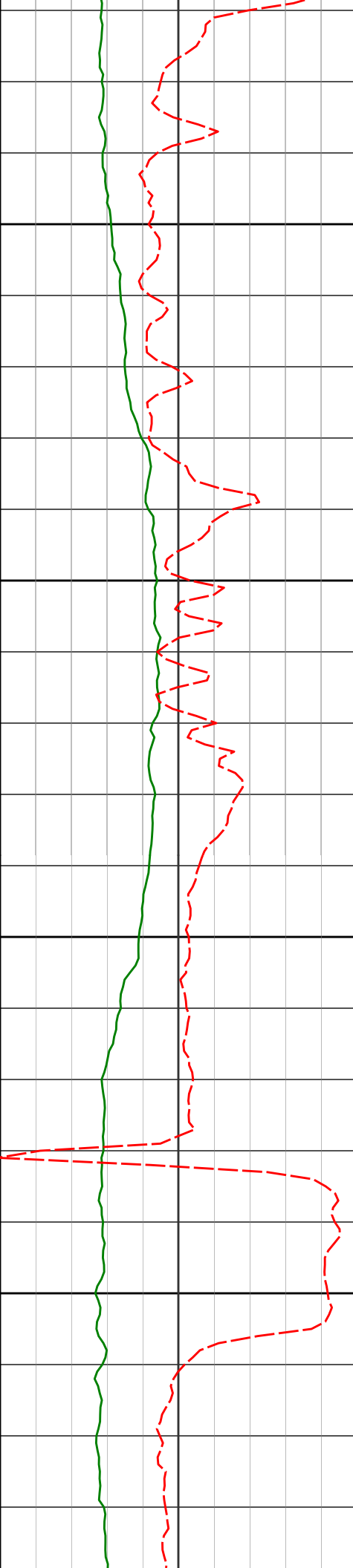
5205.03'

14092'

90.74°

0.63° 7250.03'

5299.02'



14186'

89.26°

1.94° 7250.03'

5393.01'

14200

14250

14280'

90.09°

1.95° 7250.57'

5487.01'

14300

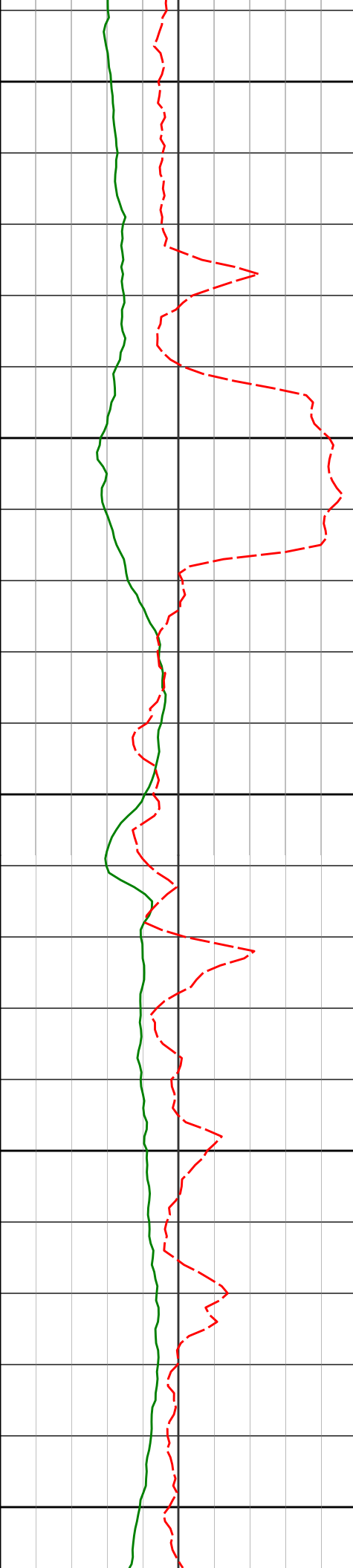
14350

14374'

90.28°

1.71° 7250.26'

5581.00'



14400

14450

14500

14550

14600

14469'

89.48°

2.06° 7250.46'

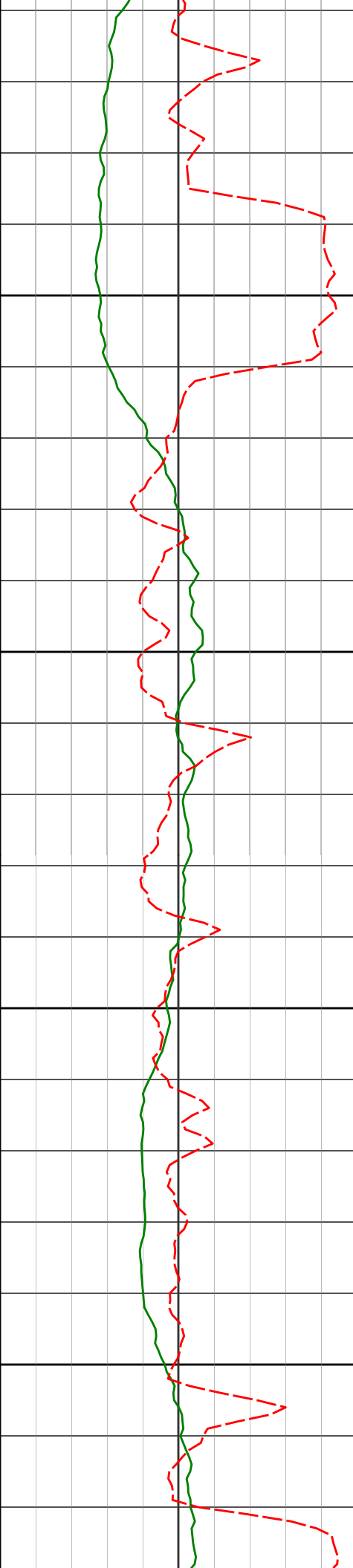
5676.00'

14563'

89.85°

2.05° 7251.01'

5769.99'



14650

14700

14750

14800

14658'

14753'

88.34°

88.49°

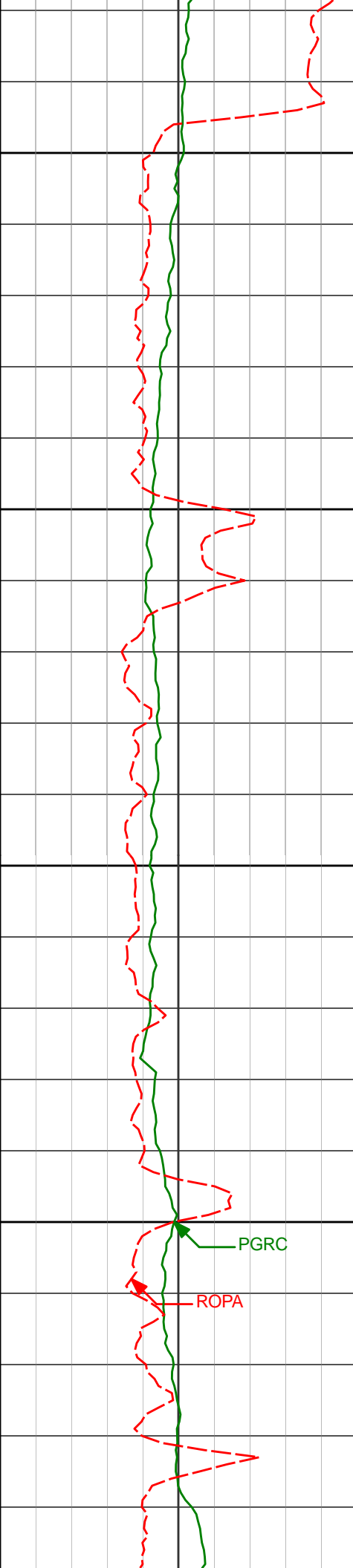
2.83° 7252.51'

3.07° 7255.14'

5864.96'

5959.89'





14850

14900

14950

15000

14848'

14943'

15037'

90.15°

90.00°

90.00°

1.99° 7256.27'

1.85° 7256.14'

1.99° 7256.14'

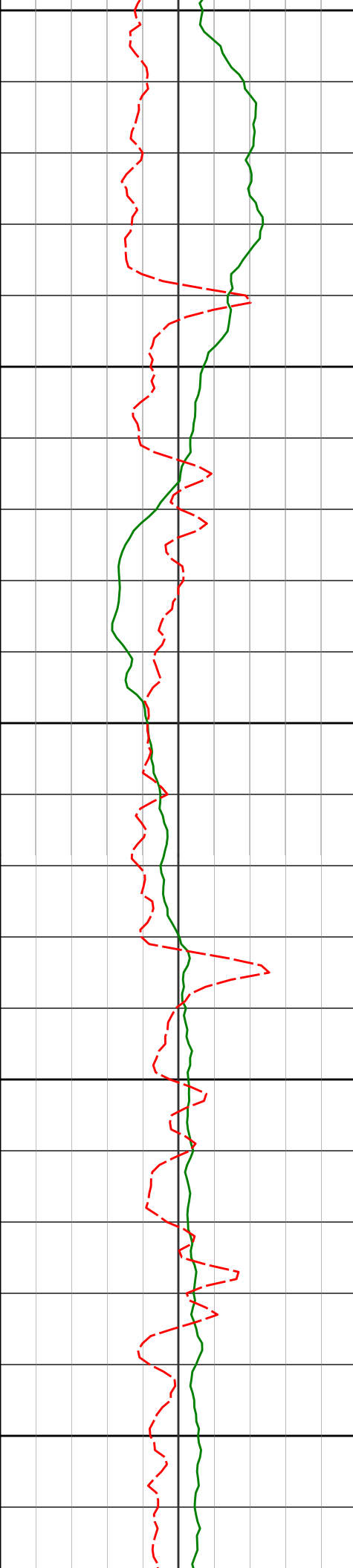
6054.86'

6149.86'

6243.85'

PGRC

ROPA



15050

15100

15150

15200

15250

15132'

90.15°

2.48° 7256.02'

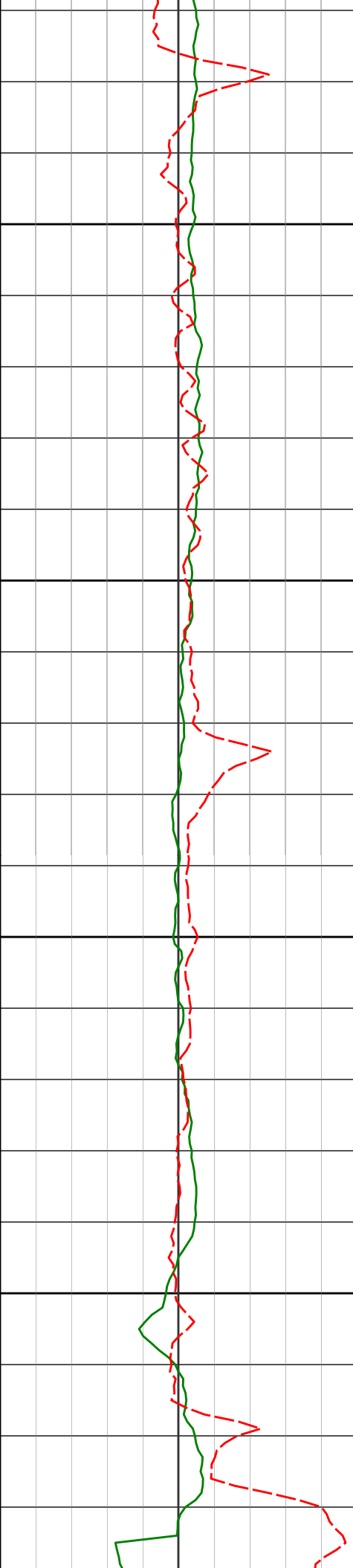
6338.84'

15226'

90.06°

2.03° 7255.85'

6432.83'



15300

15321'

90.71°

2.31° 7255.21'

6527.82'

15350

15400

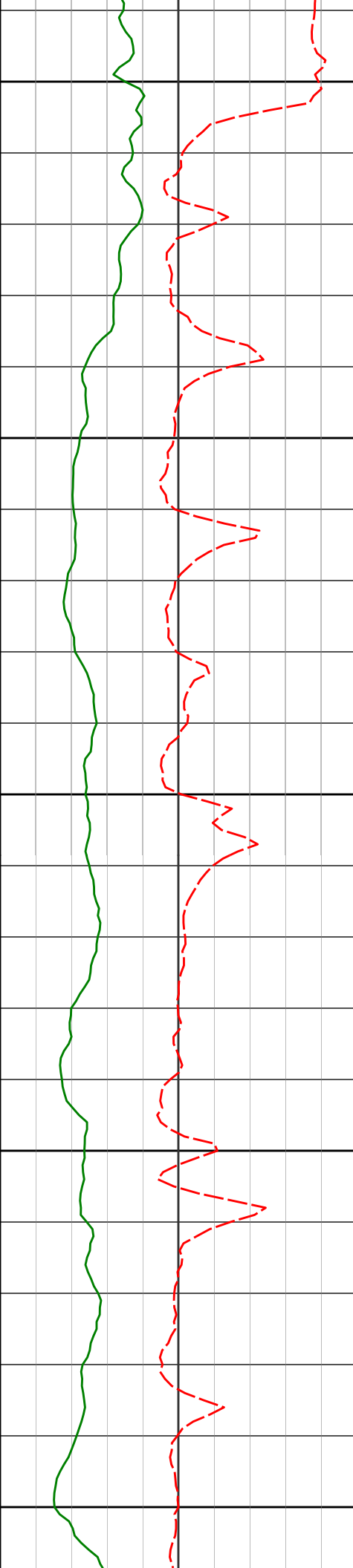
15415'

90.83°

2.81° 7253.95'

6621.79'

15450



15500

15510'

90.25°

0.11° 7253.05'

6716.78'

15550

15600

15604'

89.75°

0.23° 7253.05'

6810.76'

15650

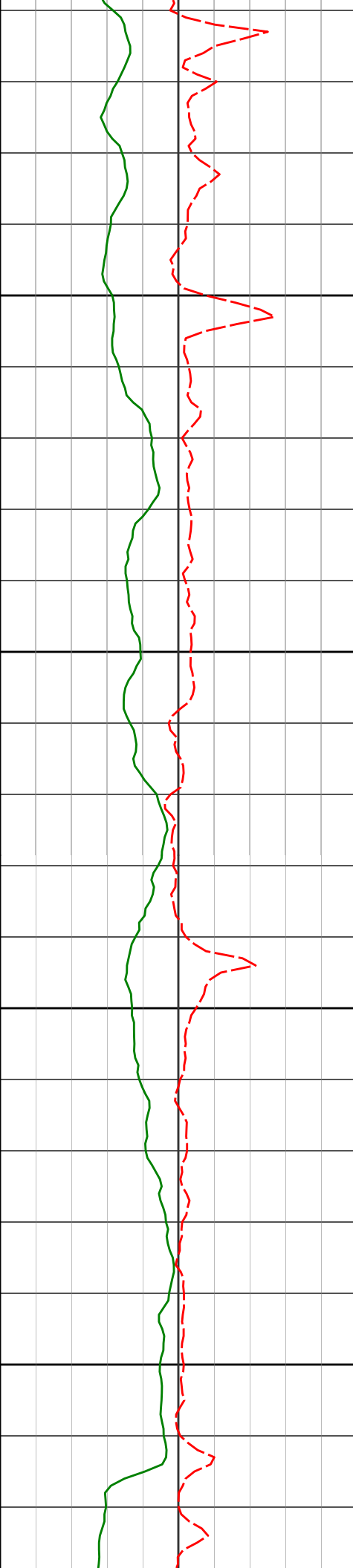
15700

15698'

89.54°

0.06° 7253.63'

6904.73'



15750

15793'

89.45°

0.05° 7254.47'

6999.70'

15800

15850

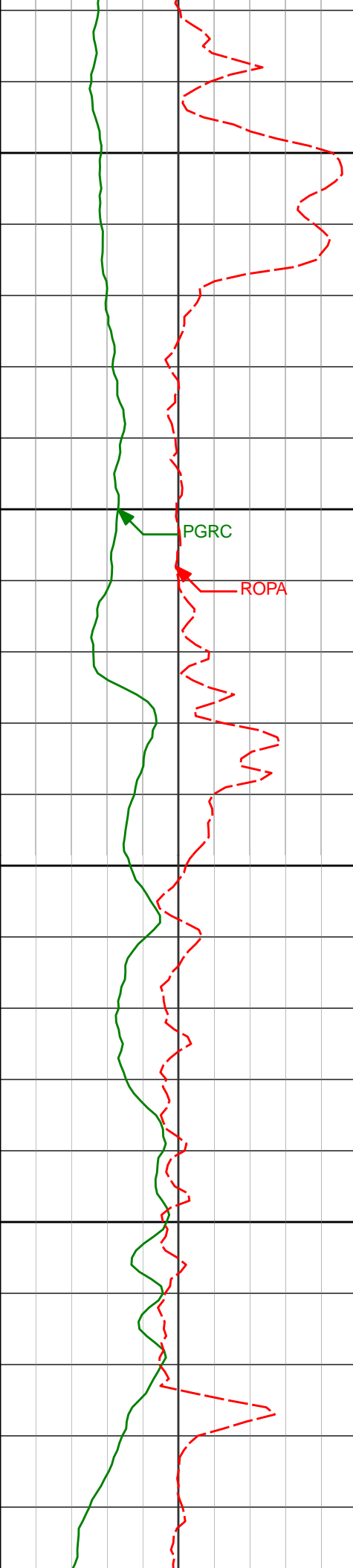
15887'

89.32°

359.86° 7255.48'

7093.67'

15900



15950

15982'

90.43°

1.14° 7255.69'

7188.65'

16000

PGRC

ROPA

16050

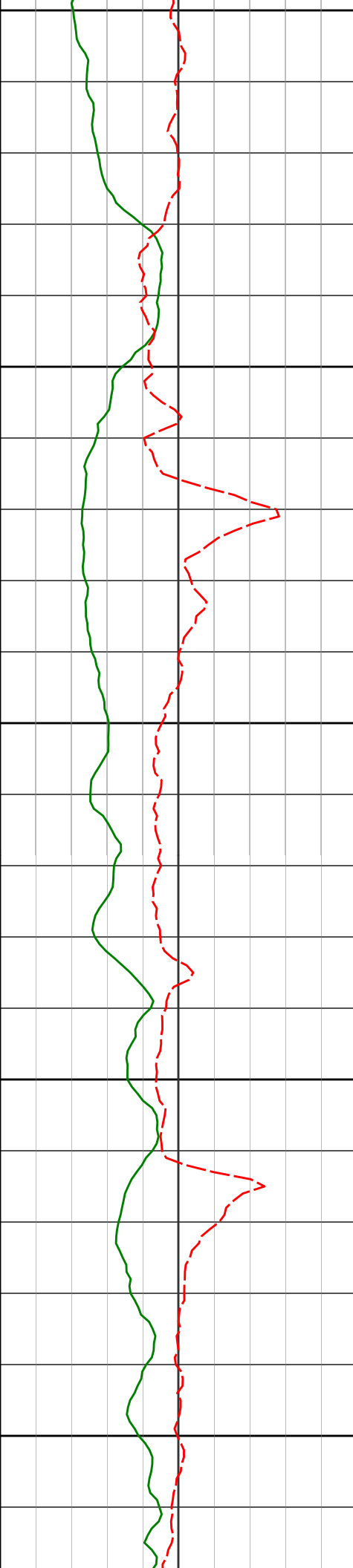
16076'

90.80°

0.71° 7254.68'

7282.64'

16100



16150

16171'

91.20°

0.59° 7253.02'

7377.62'

16200

16250

16266'

91.42°

0.13° 7250.85'

7472.58'

16300

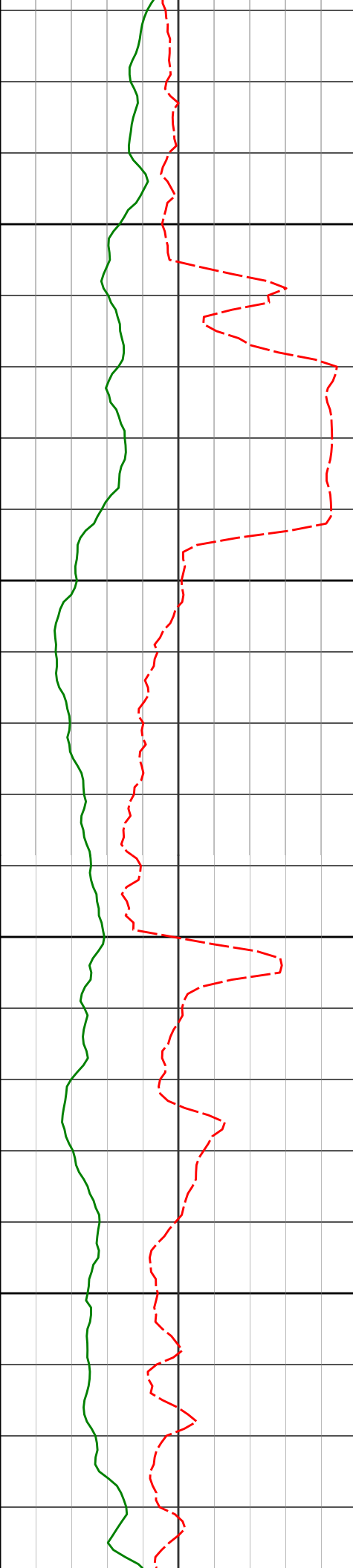
16350

16360'

91.76°

0.12° 7248.24'

7566.52'



16400

16450

16500

16550

16454'

89.88°

0.79° 7246.89'

7660.49'

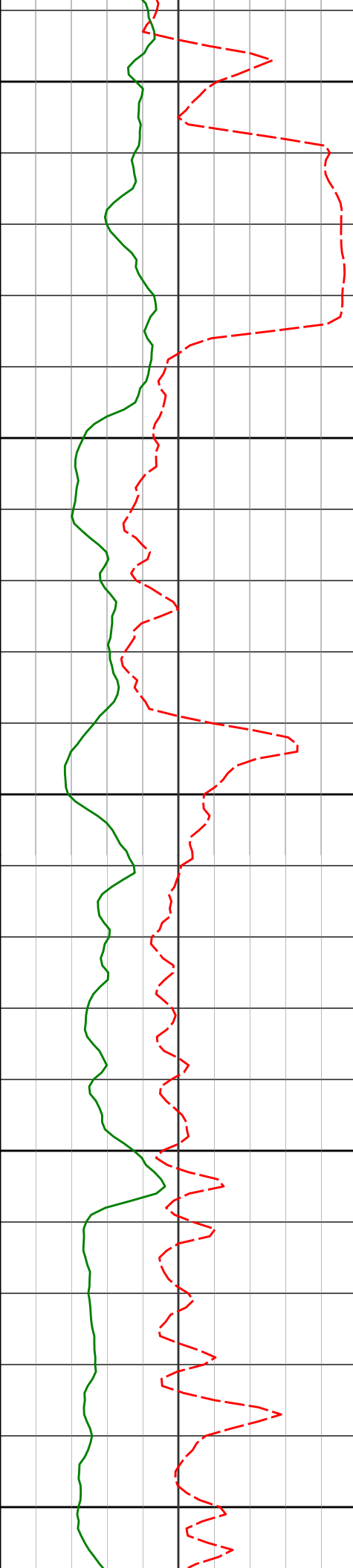
16549'

90.55°

0.64° 7246.54'

7755.48'





16600

16643'

89.17°

1.43° 7246.77'

7849.47'

16650

16700

16737'

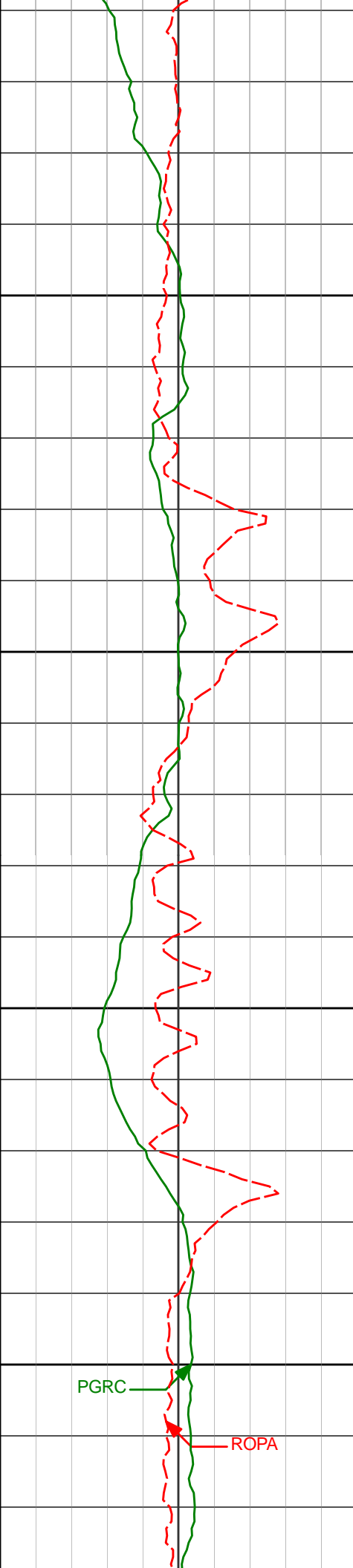
89.72°

1.29° 7247.68'

7943.47'

16750

16800



16850

16900

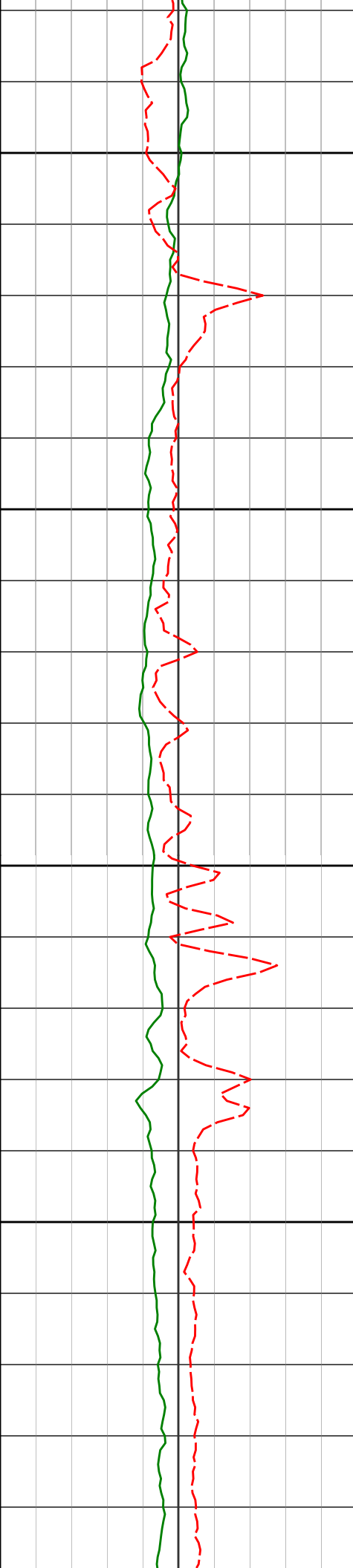
16950

17000

16832'	89.85°	1.52°	7248.03'	8038.47'
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16926'	89.51°	0.68°	7248.56'	8132.46'
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17021'	89.35°	0.59°	7249.50'	8227.45'
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17050

17100

17150

17200

17115'

89.41°

1.19° 7250.52'

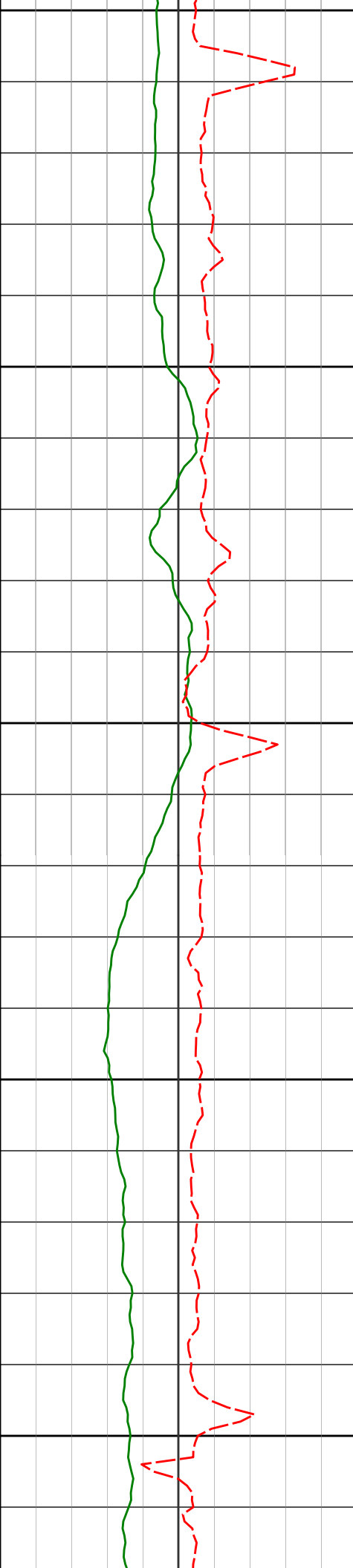
8321.44'

17210'

89.35°

0.59° 7251.55'

8416.43'



17250

17300

17350

17400

17450

17304'

89.41°

0.70° 7252.57'

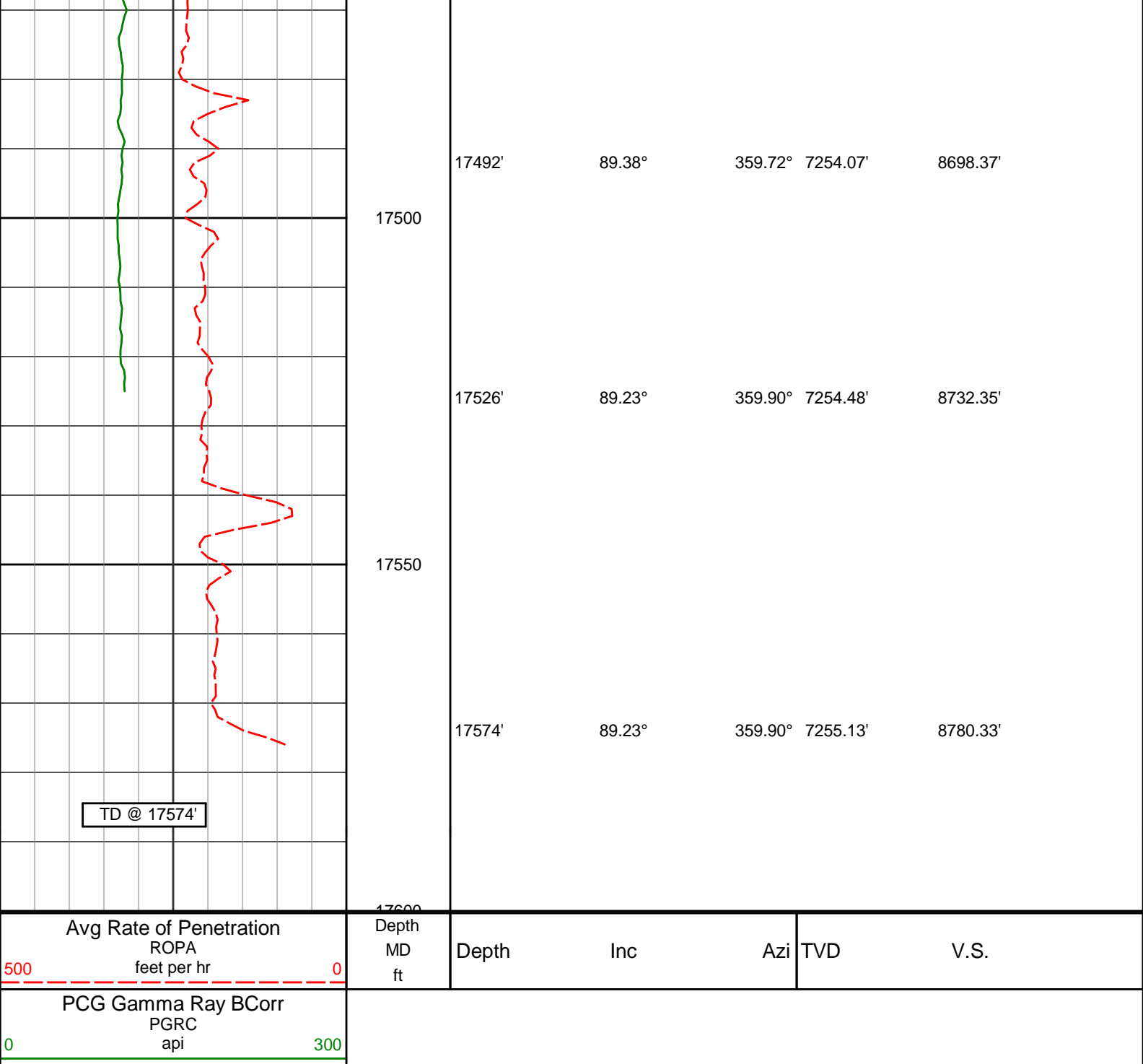
8510.42'

17398'

89.69°

0.29° 7253.31'

8604.40'



## HALLIBURTON

### DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corp.  
Thomsen 2N-31HZ  
Wattenberg  
Weld Colorado  
USA  
CA-XX-0901927441

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
1050.00	0.40	78.10	1049.97	0.80 N	1.32 E	0.83	TIE-IN
1366.00	0.35	69.69	1365.96	1.36 N	3.31 E	1.45	0.02
1458.00	1.65	192.60	1457.95	0.17 N	3.28 E	0.25	2.03
1550.00	3.37	193.02	1549.86	3.76 S	2.38 E	-3.70	1.87
17574.00	89.23	359.90	7255.13	8780.33			

1643.00	4.90	193.91	1642.61	10.28 S	0.81 E	-10.25	1.65
1734.00	7.33	196.85	1733.09	19.61 S	1.80 W	-19.65	2.69
1826.00	8.44	202.25	1824.22	31.47 S	6.06 W	-31.61	1.45
1917.00	10.10	193.01	1914.03	45.43 S	10.39 W	-45.67	2.44
2011.00	12.88	184.14	2006.15	63.92 S	13.00 W	-64.22	3.50
2105.00	14.63	180.66	2097.45	86.24 S	13.89 W	-86.56	2.06
2200.00	14.02	174.67	2189.50	109.69 S	12.96 W	-109.98	1.69
2294.00	15.58	179.52	2280.38	133.66 S	11.80 W	-133.91	2.12
2388.00	16.34	184.79	2370.76	159.46 S	12.80 W	-159.73	1.74
2483.00	16.80	183.80	2461.82	186.47 S	14.82 W	-186.78	0.57
2577.00	16.21	176.36	2551.96	213.12 S	14.89 W	-213.43	2.33
2671.00	15.79	170.60	2642.32	238.84 S	11.97 W	-239.06	1.75
2765.00	14.18	164.39	2733.13	262.55 S	6.78 W	-262.64	2.42
2860.00	17.07	177.36	2824.63	287.70 S	3.00 W	-287.68	4.76
2954.00	18.32	182.69	2914.19	316.24 S	3.06 W	-316.22	2.18
3048.00	19.63	188.33	3003.09	346.62 S	6.04 W	-346.66	2.40
3142.00	20.50	185.90	3091.38	378.62 S	10.02 W	-378.75	1.28
3237.00	21.58	184.86	3180.05	412.57 S	13.21 W	-412.77	1.20
3331.00	19.23	185.08	3268.14	445.22 S	16.05 W	-445.48	2.50
3426.00	20.05	180.39	3357.62	477.09 S	17.55 W	-477.38	1.87
3520.00	18.43	181.31	3446.37	508.06 S	17.99 W	-508.35	1.75
3614.00	19.67	178.66	3535.22	538.73 S	17.96 W	-539.01	1.61
3709.00	20.52	178.23	3624.44	571.36 S	17.08 W	-571.61	0.91
3803.00	20.98	183.34	3712.35	604.63 S	17.55 W	-604.88	1.99
3897.00	22.17	187.22	3799.76	639.03 S	20.76 W	-639.35	1.98
3992.00	23.49	186.78	3887.32	675.61 S	25.25 W	-676.03	1.40
4086.00	21.11	185.48	3974.28	711.07 S	29.07 W	-711.57	2.59
4181.00	23.49	186.13	4062.17	746.93 S	32.73 W	-747.51	2.52
4275.00	22.82	185.22	4148.60	783.71 S	36.39 W	-784.37	0.81
4369.00	21.39	185.40	4235.69	818.93 S	39.66 W	-819.66	1.52
4463.00	23.63	183.09	4322.52	854.81 S	42.29 W	-855.60	2.56
4558.00	21.48	182.73	4410.25	891.20 S	44.14 W	-892.02	2.27
4652.00	24.62	179.57	4496.74	927.98 S	44.82 W	-928.81	3.59
4746.00	22.89	178.33	4582.77	965.84 S	44.14 W	-966.64	1.92
4841.00	21.56	177.27	4670.71	1001.75 S	42.77 W	-1002.50	1.46
4935.00	22.41	183.68	4757.89	1036.88 S	43.10 W	-1037.63	2.71
5030.00	20.80	183.25	4846.21	1071.80 S	45.21 W	-1072.59	1.70
5124.00	21.57	182.59	4933.86	1105.72 S	46.94 W	-1106.55	0.86
5218.00	20.13	182.70	5021.70	1139.14 S	48.48 W	-1139.99	1.53
5313.00	21.59	180.99	5110.47	1172.95 S	49.56 W	-1173.82	1.66
5407.00	20.83	181.60	5198.11	1206.95 S	50.32 W	-1207.82	0.84
5502.00	19.52	181.26	5287.27	1239.70 S	51.14 W	-1240.59	1.38
5596.00	20.85	179.96	5375.50	1272.13 S	51.48 W	-1273.02	1.49
5690.00	19.26	180.69	5463.80	1304.36 S	51.65 W	-1305.24	1.71
5784.00	17.39	180.13	5553.03	1333.92 S	51.87 W	-1334.79	2.00
5879.00	18.16	176.95	5643.49	1362.90 S	51.11 W	-1363.75	1.30
5973.00	18.25	177.75	5732.79	1392.23 S	49.76 W	-1393.04	0.28
6067.00	16.74	176.10	5822.44	1420.45 S	48.26 W	-1421.21	1.69
6162.00	15.02	174.31	5913.81	1446.35 S	46.11 W	-1447.05	1.88
6256.00	12.59	176.26	6005.09	1468.70 S	44.23 W	-1469.34	2.63
6351.00	10.20	184.28	6098.21	1487.42 S	44.18 W	-1488.06	3.01
6445.00	9.29	183.38	6190.86	1503.29 S	45.25 W	-1503.95	0.98
6539.00	5.85	185.58	6284.02	1515.64 S	46.16 W	-1516.32	3.67
6633.00	3.98	186.53	6377.67	1523.65 S	47.00 W	-1524.35	1.99
6728.00	2.94	191.52	6472.50	1529.31 S	47.86 W	-1530.03	1.14
6822.00	0.26	93.29	6566.46	1531.69 S	48.13 W	-1532.41	3.18
6916.00	2.03	350.07	6660.44	1530.06 S	48.21 W	-1530.78	2.24
6963.00	6.52	0.16	6707.30	1526.57 S	48.34 W	-1527.30	9.65
7011.00	15.63	4.85	6754.35	1517.38 S	47.79 W	-1518.10	19.06
7058.00	23.99	2.97	6798.53	1501.50 S	46.75 W	-1502.20	17.84
7105.00	28.13	359.65	6840.75	1480.87 S	46.33 W	-1481.56	9.34
7152.00	27.80	358.95	6882.26	1458.83 S	46.60 W	-1459.54	0.99
7199.00	27.40	358.34	6923.91	1437.06 S	47.11 W	-1437.79	1.04
7246.00	26.78	359.81	6965.76	1415.67 S	47.46 W	-1416.41	1.94
7293.00	27.58	359.72	7007.57	1394.20 S	47.55 W	-1394.95	1.70
7340.00	28.37	0.40	7049.07	1372.15 S	47.52 W	-1372.91	1.81
7387.00	36.00	350.62	7088.85	1347.30 S	49.70 W	-1348.12	19.61
7434.00	44.24	353.61	7124.76	1317.33 S	53.78 W	-1318.25	18.00
7482.00	50.66	354.44	7157.21	1282.17 S	57.45 W	-1283.20	13.44
7529.00	55.82	356.17	7185.33	1244.66 S	60.51 W	-1245.78	11.37
7576.00	60.58	356.43	7210.08	1204.81 S	63.09 W	-1206.00	10.14
7623.00	66.26	359.10	7231.11	1162.83 S	64.70 W	-1164.08	13.11
7671.00	75.27	358.93	7246.91	1117.56 S	65.48 W	-1118.84	18.77
7718.00	82.14	359.10	7256.11	1071.51 S	66.27 W	-1072.82	14.62
7765.00	86.02	1.03	7260.95	1024.77 S	66.21 W	-1026.10	9.21

7818.00	90.12	5.72	7262.74	971.92 S	63.10 W	-973.18	11.75
7913.00	90.62	5.96	7262.13	877.41 S	53.43 W	-878.47	0.58
8007.00	89.48	5.06	7262.04	783.85 S	44.40 W	-784.71	1.55
8101.00	90.40	3.69	7262.14	690.13 S	37.23 W	-690.84	1.76
8195.00	91.02	2.36	7260.98	596.27 S	32.27 W	-596.89	1.56
8290.00	89.26	1.09	7260.75	501.32 S	29.41 W	-501.89	2.28
8385.00	89.72	1.31	7261.59	406.34 S	27.42 W	-406.90	0.54
8479.00	89.97	1.03	7261.85	312.36 S	25.50 W	-312.90	0.40
8573.00	90.00	1.34	7261.87	218.38 S	23.56 W	-218.90	0.33
8667.00	90.62	1.31	7261.36	124.41 S	21.39 W	-124.90	0.66
8762.00	91.14	1.42	7259.90	29.45 S	19.12 W	-29.91	0.56
8856.00	90.06	1.12	7258.92	64.52 N	17.04 W	64.08	1.19
8950.00	90.52	0.96	7258.44	158.50 N	15.34 W	158.08	0.52
9045.00	91.20	1.23	7257.02	253.48 N	13.52 W	253.06	0.77
9139.00	89.63	1.34	7256.34	347.45 N	11.41 W	347.06	1.67
9233.00	88.55	1.65	7257.83	441.40 N	8.96 W	441.04	1.20
9328.00	88.98	1.71	7259.88	536.34 N	6.18 W	536.02	0.46
9422.00	89.60	1.73	7261.04	630.29 N	3.35 W	630.01	0.66
9517.00	90.28	2.24	7261.14	725.23 N	0.06 W	725.01	0.89
9611.00	88.71	1.19	7261.97	819.18 N	2.75 E	819.00	2.01
9706.00	88.64	1.75	7264.17	914.12 N	5.19 E	913.97	0.59
9800.00	88.74	1.81	7266.31	1008.05 N	8.10 E	1007.94	0.12
9894.00	89.14	1.56	7268.05	1102.00 N	10.87 E	1101.93	0.50
9989.00	89.23	1.77	7269.40	1196.95 N	13.63 E	1196.92	0.24
10083.00	88.95	2.46	7270.90	1290.87 N	17.10 E	1290.90	0.79
10177.00	89.04	2.12	7272.55	1384.78 N	20.85 E	1384.87	0.37
10271.00	91.29	3.15	7272.28	1478.67 N	25.17 E	1478.84	2.63
10366.00	91.36	2.77	7270.08	1573.52 N	30.08 E	1573.78	0.41
10460.00	91.51	3.00	7267.73	1667.37 N	34.81 E	1667.72	0.29
10554.00	91.42	2.95	7265.32	1761.21 N	39.68 E	1761.66	0.11
10646.00	90.65	1.98	7263.66	1853.11 N	43.64 E	1853.63	1.35
10737.00	90.46	2.01	7262.78	1944.05 N	46.81 E	1944.62	0.21
10829.00	90.96	2.00	7261.64	2035.99 N	50.03 E	2036.60	0.54
10921.00	90.93	2.20	7260.12	2127.92 N	53.40 E	2128.58	0.22
11012.00	90.80	2.09	7258.75	2218.84 N	56.80 E	2219.57	0.19
11103.00	90.77	2.09	7257.50	2309.77 N	60.12 E	2310.55	0.03
11195.00	91.14	2.08	7255.97	2401.70 N	63.47 E	2402.53	0.40
11286.00	91.39	1.64	7253.96	2492.63 N	66.42 E	2493.51	0.56
11378.00	91.14	1.94	7251.93	2584.56 N	69.29 E	2585.48	0.42
11470.00	89.69	1.74	7251.26	2676.51 N	72.25 E	2677.48	1.59
11562.00	88.55	1.41	7252.67	2768.46 N	74.78 E	2769.46	1.29
11655.00	88.86	1.67	7254.78	2861.40 N	77.28 E	2862.44	0.44
11748.00	89.11	1.79	7256.42	2954.35 N	80.08 E	2955.42	0.30
11841.00	88.80	1.57	7258.12	3047.29 N	82.81 E	3048.41	0.41
11932.00	90.00	0.81	7259.07	3138.26 N	84.70 E	3139.40	1.56
12024.00	90.37	0.95	7258.78	3230.25 N	86.11 E	3231.39	0.43
12117.00	90.22	1.08	7258.30	3323.24 N	87.76 E	3324.39	0.21
12209.00	90.62	2.22	7257.62	3415.19 N	90.41 E	3416.39	1.31
12300.00	90.80	3.86	7256.49	3506.06 N	95.23 E	3507.34	1.81
12392.00	91.48	1.62	7254.66	3597.93 N	99.63 E	3599.29	2.54
12486.00	90.15	0.31	7253.33	3691.90 N	101.21 E	3693.27	1.99
12581.00	90.37	0.50	7252.90	3786.90 N	101.88 E	3788.26	0.31
12675.00	90.68	0.74	7252.03	3880.89 N	102.90 E	3882.24	0.42
12769.00	91.05	0.88	7250.62	3974.87 N	104.23 E	3976.23	0.42
12864.00	91.17	1.06	7248.77	4069.83 N	105.84 E	4071.21	0.23
12958.00	91.02	0.53	7246.98	4163.81 N	107.14 E	4165.18	0.59
13053.00	89.69	0.58	7246.39	4258.80 N	108.06 E	4260.17	1.40
13148.00	89.78	0.54	7246.83	4353.79 N	108.99 E	4355.16	0.10
13242.00	89.85	0.50	7247.13	4447.79 N	109.84 E	4449.15	0.09
13337.00	89.82	0.32	7247.41	4542.79 N	110.52 E	4544.13	0.19
13431.00	90.03	0.73	7247.53	4636.78 N	111.38 E	4638.12	0.49
13526.00	89.45	0.33	7247.96	4731.78 N	112.26 E	4733.11	0.74
13620.00	89.54	0.32	7248.79	4825.77 N	112.80 E	4827.08	0.10
13715.00	89.97	0.36	7249.20	4920.77 N	113.36 E	4922.07	0.45
13809.00	90.25	0.33	7249.02	5014.77 N	113.93 E	5016.05	0.30
13903.00	89.48	0.69	7249.24	5108.76 N	114.76 E	5110.04	0.90
13998.00	89.41	0.81	7250.16	5203.75 N	116.01 E	5205.03	0.15
14092.00	90.74	0.63	7250.03	5297.74 N	117.19 E	5299.02	1.43
14186.00	89.26	1.94	7250.03	5391.71 N	119.30 E	5393.01	2.10
14280.00	90.09	1.95	7250.57	5485.65 N	122.49 E	5487.01	0.88
14374.00	90.28	1.71	7250.26	5579.61 N	125.49 E	5581.00	0.33
14469.00	89.48	2.06	7250.46	5674.55 N	128.61 E	5676.00	0.92
14563.00	89.85	2.05	7251.01	5768.49 N	131.98 E	5769.99	0.39
14658.00	88.34	2.83	7252.51	5863.39 N	136.03 E	5864.96	1.79

14753.00	88.49	3.07	7255.14	5958.23 N	140.91 E	5959.89	0.30
14848.00	90.15	1.99	7256.27	6053.12 N	145.11 E	6054.86	2.08
14943.00	90.00	1.85	7256.14	6148.07 N	148.29 E	6149.86	0.22
15037.00	90.00	1.99	7256.14	6242.02 N	151.44 E	6243.85	0.15
15132.00	90.15	2.48	7256.02	6336.94 N	155.14 E	6338.84	0.54
15226.00	90.06	2.03	7255.85	6430.87 N	158.84 E	6432.83	0.49
15321.00	90.71	2.31	7255.21	6525.80 N	162.44 E	6527.82	0.74
15415.00	90.83	2.81	7253.95	6619.70 N	166.64 E	6621.79	0.55
15510.00	90.25	0.11	7253.05	6714.65 N	169.06 E	6716.78	2.91
15604.00	89.75	0.23	7253.05	6808.65 N	169.34 E	6810.76	0.55
15698.00	89.54	0.06	7253.63	6902.65 N	169.57 E	6904.73	0.29
15793.00	89.45	0.05	7254.47	6997.65 N	169.67 E	6999.70	0.10
15887.00	89.32	359.86	7255.48	7091.64 N	169.59 E	7093.67	0.24
15982.00	90.43	1.14	7255.69	7186.63 N	170.42 E	7188.65	1.78
16076.00	90.80	0.71	7254.68	7280.62 N	171.94 E	7282.64	0.60
16171.00	91.20	0.59	7253.02	7375.60 N	173.02 E	7377.62	0.44
16266.00	91.42	0.13	7250.85	7470.57 N	173.61 E	7472.58	0.54
16360.00	91.76	0.12	7248.24	7564.53 N	173.82 E	7566.52	0.36
16454.00	89.88	0.79	7246.89	7658.51 N	174.56 E	7660.49	2.12
16549.00	90.55	0.64	7246.54	7753.51 N	175.75 E	7755.48	0.72
16643.00	89.17	1.43	7246.77	7847.49 N	177.45 E	7849.47	1.69
16737.00	89.72	1.29	7247.68	7941.46 N	179.68 E	7943.47	0.60
16832.00	89.85	1.52	7248.03	8036.43 N	182.01 E	8038.47	0.28
16926.00	89.51	0.68	7248.56	8130.41 N	183.81 E	8132.46	0.96
17021.00	89.35	0.59	7249.50	8225.40 N	184.86 E	8227.45	0.19
17115.00	89.41	1.19	7250.52	8319.38 N	186.32 E	8321.44	0.64
17210.00	89.35	0.59	7251.55	8414.36 N	187.80 E	8416.43	0.63
17304.00	89.41	0.70	7252.57	8508.35 N	188.86 E	8510.42	0.13
17398.00	89.69	0.29	7253.31	8602.34 N	189.67 E	8604.40	0.53
17492.00	89.38	359.72	7254.07	8696.34 N	189.68 E	8698.37	0.69
17526.00	89.23	359.90	7254.48	8730.34 N	189.57 E	8732.35	0.69
17574.00	89.23	359.90	7255.13	8778.33 N	189.48 E	8780.33	0.00

**CALCULATION BASED ON MINIMUM CURVATURE METHOD**

**SURVEY COORDINATES RELATIVE TO WELL SYSTEM REFERENCE POINT**

**TVD VALUES GIVEN RELATIVE TO DRILLING MEASUREMENT POINT**

**VERTICAL SECTION RELATIVE TO WELL HEAD**

**VERTICAL SECTION IS COMPUTED ALONG A DIRECTION OF 1.42 DEGREES (TRUE)**

**A TOTAL CORRECTION OF 8.41 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.**

**HORIZONTAL DISPLACEMENT(CLOSURE) AT 17574.00 FEET**

**IS 8780.38 FEET ALONG 1.24 DEGREES (TRUE)**

**Surveys have been tied onto gyro data.**

**Last survey is a projection to bit.**